Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Support program to the cotton seed supply chain in Sub-Saharan African countries

Work Package 1: Baseline studies

Cottonseed Sector Study in Ethiopia
5-15 March 2020

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Jacques LANÇON
Cotton breeder
CIRAD (Centre for International Cooperation in Agronomic Research for Development)

Berhanu WOLDU
Cotton expert

Funding: BMZ (Federal Ministry for Economic Cooperation and Development, Germany) through GIZ (Agency for International Cooperation, Germany)

Ethiopian CottonSeed System Survey

The mission

Dates	**March 6 to March 13, 2020**
Purpose	**Survey of the Cotton seed system in Ethiopia**
Itinerary	Addis Ababa, Awash, Gewane, Humera, Dansha, Addis Ababa
Team	Jacques **LANÇON** (Cirad), Berhanu **WOLDU** (National expert)

Persons met during the mission

Name	Organization	Position
Mr. Demile **FENTIE**	Aweke Fentie Irrigation Farm	Manager
Mr. Berhane **MEZGEBO**	Dansha Farmers' Cooperative Union	President
Mr. Mulu **GEBREMARIAM**		Agronomist
Ms. Alemitu **BEZABIH**		Farmer
Mr. Guesh **GEBREHIWOT**		Farmer
Mr. Berhanu **TESHOME**		Farmer
Mr. Tesfaye **DESTA**		Farmer
Mr. Asefa **AGA**	ECPEGA	General Manager
Mr. Merdasa **BALCHA**	EIAR	Head of the Cotton program
Mr. Donis **GURMESSA**		Breeder
Mr. Samuel **DAMTEW**		Breeder
Mr. Mesele **MEKURIA**	ETIDI	Deputy Director General of Cotton Development Sector
Mr. Samson **ASEFA**		Cotton Development Directorate
Mr. Bahlibi **GEBRU**	Hiwot Agricultural Farm Mechanization	Manager
Mr. Gabretsadik **GEBREGZIABHER**		
Ms. Laura **SCHMIDT**	German Embassy	Head of Development Cooperation
Ms. Corine **WIESENBACH**	GIZ	Portfolio manager
Ms. Selvi Dini Aprilia **ALESSIE**		Team Leader
Ms. Elisabeth van den **AKKER**		Programme Manager SDR-ASAL
Mr. Yared **FEKADE**		Cotton expert
Mr. Mesfin **MELAKU**	Ministry of Agriculture	Plant Health Regulatory Directorate

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In Ethiopia: all the people met during the consultancy (with agreement of GIZ)

Dr Jacques Lançon Chargé de mission - Direction Générale Déléguée à la Recherche et à la Stratégie
Jacques.lancon@cirad.fr Adresse : Avenue Agropolis, Montpellier, FRANCE Mobile : +33 (0) 689 477 516

Content of the report

Acknowledgement

We want here to thank warmly the personnel of GIZ main office in Addis for their kindness and efficiency ! They provided all the required support to organize this mission and its debriefing. Our particular acknowledgements to Ms. Corin WIESENBACH (Portfolio Manager), Ms. Dini Aprilia ALESSIE (Team Leader), and Ms. Hanna NIGUSSIE (Events and Booking Officer).

Our thanks go also to all the people who devoted some of their precious time to share very frank views and relevant information with us. The box in page 1 of this report gives the list of these persons. Among them, we want to specially thank Mr. Mulu GEBREMARIAM who introduced us to the Dansha Union and Ms. Alemitu BEZABIH, farmer and member of the same Union, for the drink and the impressive demonstration of manual spinning.

Figure 1. Traditional coffee making plays a major role in Ethiopian way of life and sense of hospitality.

Executive summary

The mission

- **Objective.** This mission accounted for the first Work Package of a GIZ-Cirad project funded by BMZ (Germany). The whole project intends to strengthen the Cottonseed sector in Africa, while this mission aimed at implementing a cottonseed sector study in Ethiopia.
- **Implementation.** The mission was conducted by Dr. J. LANÇON for Cirad and Mr. B. WOLDU, national cotton expert, between the 5th and the 15th of April 2020. Considering the time to spend in the country, the team selected visits and interviews with directors, farm managers, experts, researchers and farmers in Addis, around Awash (Afar region) in the irrigated cotton zone, and around Humera (Tigray region) in the rainfed area, as shown in Fig. 2.

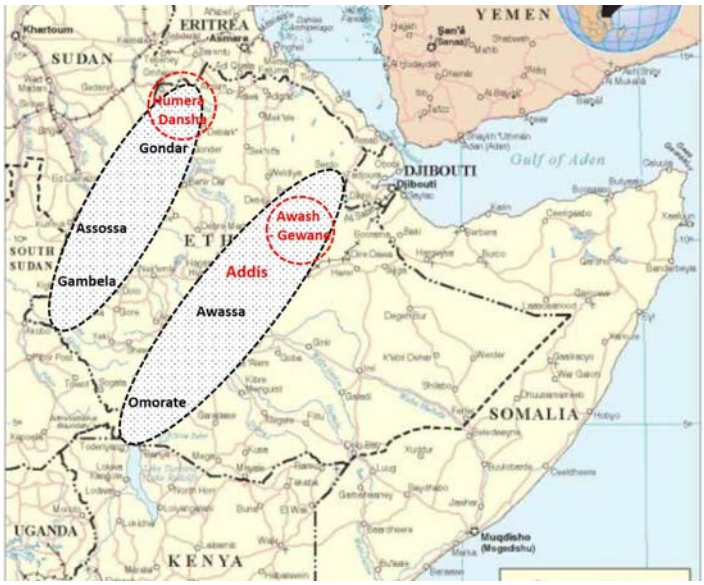


Figure 2. Major cotton production area in Ethiopia (in grey) and places visited during the mission (in red).

Cotton in Ethiopia

- **Production.** For the past 10 years, the area planted has been varying between 60,000 and 100,000 ha, depending on the fluctuations of the market price (fig. 3). It was distributed among 7 different regions, the major ones being Amhara and Tigray for rainfed cotton, Afar (Awash valley) and South, SNNPR (Omo valley) for irrigated cotton. There is a big potential for cotton cultivation, and a strong political desire to develop the crop together with the industrial capacity of the country, up to 1 M. tons of seed cotton or more. However, the crop development is not yet following the pace expected by the strategic document (NCDS).

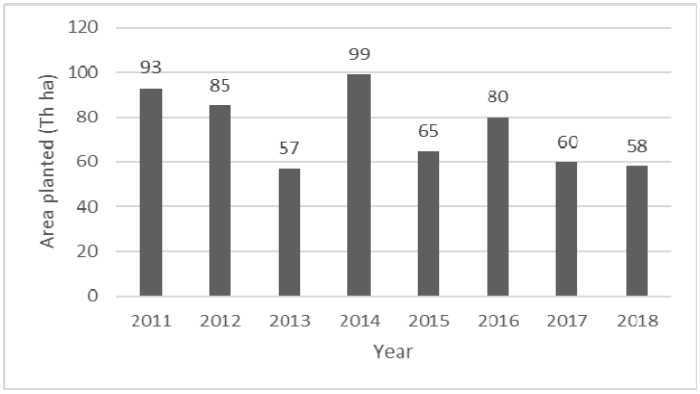


Figure 3. Seed cotton production in Ethiopia from 2011 to 2018.

- **Cropping.** A diversity of production systems coexist under irrigation (26% of the total cotton area) or rainfed conditions, and from very large farms developed by investors (more than 200 ha of cotton) to very small family farms (in general less than 1 ha). The large scale farms are highly mechanized (Fig. 4), not the small. Weeding and harvesting are still manual everywhere, and labor demanding. The large farms manage approx. 70% of all the cotton fields, 90% of the irrigated lands, and 60% of the rainfed ones. Considering the limited amounts of fertilizers and pesticides

used, the average SC yields are relatively high compared with major African countries, 2.5 tons/ha with irrigation, and 1.5 ton in rainfed conditions. Accessible information cannot help us to relate this to one cause in particular among fertile volcanic soils, favorable rainfall or climate pattern, limited pest pressure, broadcast planting, which is very common in rainfed areas, or … approximate estimates. According to the available data, there are only 10 to 15% yield difference between large and small farms.

Figure 4. Mechanized farm in the Afar region.

- **Sustainability.** Large scale farms have often been set with the funds of investors whose aim is to get good and quick profits in return. Prior investments have been made in view of short term profitability (field preparation, machines, management), and the cropping system in place is not environment friendly or sustainable. Few and temporary shelters or roads, wide open fields with rare trees, intensive ploughing and mono-cropping do not guarantee long term sustainability of most of these farms (Fig. 5).

Figure 5. Large farms with open fields in the rainfed areas, Tigray region. The crop has been broadcasted.

- **Seed system.** There is a system of seed production, loosely facilitated by ETIDI and the MoA. It is based on the applicable laws (Proclamation and Regulation). Research is producing the early generations seeds (Breeder's and Pre-basic), and passes them to authorized seed processors to multiply the following generations (Basic and Certified). The processors have to get a permit from MoA or BoAs to produce and sale 'Quality Declared Seeds' (QDS). They usually are large scale farmers, ginners or farmers-ginners. With the QDS category of seed, quality control is insured by the processor himself. However, at the national or regional levels, there seems to be hardly any control on the quantity or quality of the seed produced under this system. New varieties may be imported, with a permit of the MoA, or locally produced by Werer Agricultural Research Center (WARC). They have to be tested for one or two years before they can be released by the National Variety Release Committee (NVRC).
- **Varieties.** The main two commercial varieties are still two US varieties, bred for irrigated cotton, Deltapine 90, released in 1989, and Acala SJ2 in 1986. According to research results and industrial says, they don't correspond to the present standards, and the Ethiopian cotton is penalized on both national and international markets. A more recent variety, named Claudia, is under multiplication. It has a better GOT and a longer fibre than DP 90. Largely grown in Turkey, Claudia is supposed to be of Australian origin. It was imported by the company EAID and released by the NRVC in 2014.
- **Cotton breeding.** National research is conducted by WARC, in the Awash valley. It tests or creates varieties adapted to irrigated conditions. It has recently produced several varieties which could compete with DP 90 or even Claudia, in particular Sisikuk which was released in 2015. There is no research or testing done for the cropping systems under natural rainfall.
- **GMO.** Since 2015, a change in the Biosafety regulation has allowed the importation of Genetically Modified Organisms (GMO) for confined experiment. Several cotton varieties have been introduced from India by the company JK Agri Genetics and approved by the NVRC. However, they did not perform well enough to cover their cost, and they are not multiplied. More generally, the GMO experience in Burkina or India shows that it can bring a benefit for the farmers – and the environment – but it also makes the crop more risky, which can be detrimental to the small farmers and in rainfed conditions.

11 propositions to face challenges identified as priority

The experts estimate that the following challenges and propositions should be taken as priority. They are in line with the SWOT analysis presented in Figure 3.

- **Cottonseed coordination and regulation.** Although it seemed to be in place, the governance and coordination processes could not be quite fully understood during our mission. Is it well described and known by all the actors? Could it better involve the seed certification services at MoA?

  ➔ *Proposition 1: organize a concertation between MoA and MTI to set a pragmatic, not costly and efficient, quality control process independent from the seed producers and to design a seed multiplication process taking full advantage of the high yielding irrigated farms*

- **Plant breeding.** lack of genetic diversity and genetic material for mechanical harvesting and the rainfed areas.

  ➔ *Proposition 2: design specific breeding programs for mechanical harvesting or rainfed areas*

➔ *Proposition 3: network with other national cotton breeding programs, in particular for rainfed conditions*

- **Research.** lack of international exposure, knowledge and experimentation on the rainfed production systems (distance).

  ➔ *Proposition 4: Evaluate the constraints for cotton growing in the rainfed areas (rainfall pattern, climate change, cropping system / broadcast planting, biotic constraints such as Jassids, B. blight or F. wilt)*

  ➔ *Proposition 5: Evaluate technologies and practices (Crop Management Systems) more adapted to rainfed cotton (broadcast vs in line, "natural" vs chemical pest control)*

  ➔ *Proposition 6: Create a network of cotton experts in coordination with the large farm managers, to monitor the status of diseases, pests with cell phones.*

- **Seed production.** Large scale producers as experienced cotton growers, mention of Fusarium wilt-like attack, hazardness of pesticides, out-dating of active ingredient.

  ➔ *Proposition 7: Large scale cotton farms to develop a chart for sustainable cottonseed production, and commit to follow as a condition of getting authorization*

  ➔ *Proposition 8: Monitor potential raise of F. wilt (if confirmed)*

  ➔ *Proposition 9: Test alternative to present pest control (specially to organo-chlorate)*

- **Seed processing.** Quality control is only ensured by the seed producers.

  ➔ *Proposition 10: Training ginners and private quality controllers involved in seed production*

  ➔ *Proposition 11: Increase the number of random seed testing by MoA or regional BoA laboratories*

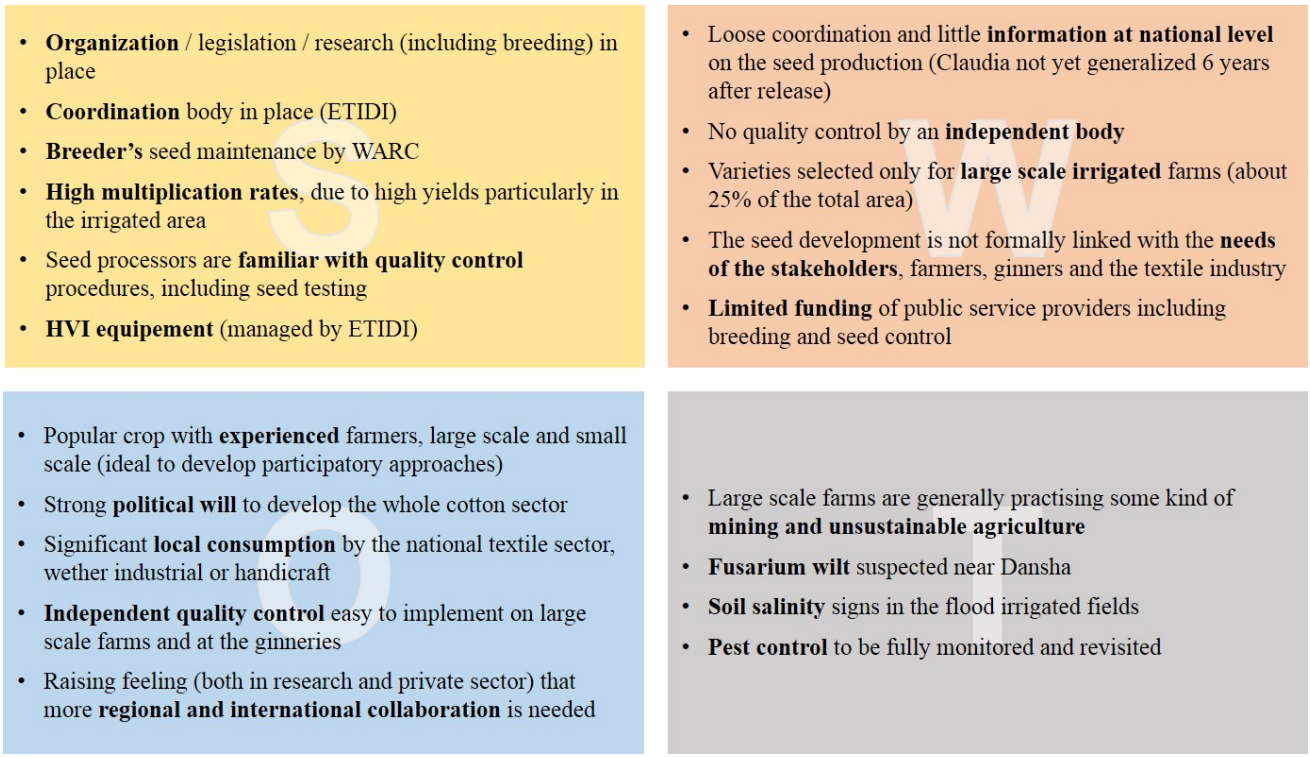


Figure 6. SWOT (Strength – Weakness – Opportunities – Threats) in cottonseed cotton production in Ethiopia.

Simplified program

- Thursday 5/03 – From Montpellier (15.25)
- Friday 6/03 in Addis Ababa (6.20) – Meeting with GIZ, German Embassy, ECGEPA and ETIDI
- Saturday 7/03 – From Addis Ababa to Awash (Afar region)
- Sunday 8/03 – Visit 1 irrigated large scale farm in Gewane
- Monday 9/03 – Visit Werer research station (EIAR)
- Tuesday 10/03 – From Addis (7.15) to Humera (10.00) – Visit 1 rainfed large scale farm (Tigray region)
- Wednesday 11/03 – Meeting with 2 small scale farmers, 1 cooperative involved in cotton, 1 ginning plant
- Thursday 12/03 – From Humera (10.30) to Addis (13.15) – Visit Seed certification service in Addis (MoA)
- Friday 13/03 – Debriefing at GIZ HQ, in Addis (9.30 to 11.30)
- Saturday 14/03 – From Addis (00.15) to Montpellier (9.45)

→ ***Detailed program at Annex 1.***

ToR of the mission

This paragraph is a transcription of the Terms of Reference included in the GIZ-Cirad contract.

Background

Pure varieties with high yield and fibre quality potential and high quality cottonseed are major factors to increase cotton productivity and value of the product harvested.

GIZ aims at supporting the African cotton commodity chains in improving the quality of the seed provided to their farmers. In order to complete four surveys on the cottonseed sector previously conducted in Ivory Coast, Mozambique, Tanzania and Zambia, Cirad has been charged to implement two new surveys in Cameroon and Ethiopia. The results will be used to adjust the content of an on-going support program for 2019-2020, and to design a more ambitious program at the Continent level for the period 2021-2025.

Objective of the mission

Cirad will work in close cooperation with national cotton research institutes, cotton development and ginning companies in Ethiopia. After a detailed assessment of the cottonseed situation and available local cotton varieties, Cirad in cooperation with relevant national partners will develop proposals.

The cottonseed sector study will include the following steps:

1. Elaborate, with the national counterpart, a guide to describe the national seed multiplication system and breeding activities
2. Complete the guide during the mission
3. Make SWOT analysis of the cottonseed sector (incl. the multiplication system and the breeding program)

4. Highlight challenges and propose interventions at different levels: frame conditions of cotton production, plant breeding, seed multiplication, seed processing and storage, marketing, regulatory procedures, seed use by cotton farmers

5. Share results with stakeholders of the cottonseed sector.

Reporting and outputs

The report will include:

- The information collected during the visits and meetings
- A cottonseed sector description based on the guide - questionnaire prepared before-hand
- SWOT analysis of the cottonseed sector (incl. the multiplication system and the breeding program)
- Propositions to improve the Cottonseed multiplication systems.

All documents will be transmitted as electronic file (word, excel, power point) to GIZ.

Table 1 – Summary of the outputs of the mission

Expected	Realization
Description of the Cottonseed sector	19/04/2020, executive summary of the report (p. 4-5)
SWOT	19/04/2020, executive summary of the report (Fig. 6)
Challenges and recommendations	19/04/2020, executive summary of the report (p. 5-6)
Information collected during and after the mission	19/04/2020, report (10 to the end)
Questionnaire	Elaborated before the mission, used as a guide to collect information on the sector during the mission (Annex 5)
Debriefing	14/03/2020, at GIZ main office in Addis

Cotton actors

Large scale producers

- Organisation: **Aweke Fentie Messele Irrigation Farm**
- Date of the interview: **8/03/20**
- Place: **Gewane, Afar region**
- Person interviewed: Mr. Debalke ABATA (Farm manager)

Farm. It was created from bush in 2008. Main problem is flooding by the Awash river, needs to build sand barriers with the bulldozer, which costed a lot of fuel. According to the farm manager, 272 ha of irrigated cotton were planted in 2019 and 350 ha planned for next season. Picking and weeding are done by hand, and it is very difficult to find the amount of labour required. The recruitment goes up to 800 km from the farm (through a specialized agency). The farm employs around 28 permanent staff + 61 drivers and guards, employed from the local community, and up to 400 people in the weeding period and 400-600 at the picking time. All workers are paid at the end of each month.

Cropping system. Rainfall from July to September, 6 irrigations in total depending on the rains, every 21 days and 14 days during the flowering period. It includes ploughing, ridging, pre-planting irrigation, weeding with tool, sowing at 90 x 20 cm (about 10 kg/ha), germinates after 5/6 days, Gap filling, thinning 3/hole, weeding etc. No use of topping or chemical as growth regulator. It is managed through irrigation.

Figure 7. Storage shade for the seeds produced on the farm.

Seeds. Germination test after delinting the seeds should be 95 to 98% (on the ground covered with a cloth). Seeds are selected from a field that has been well conducted/and performed. The crop is ginned at the ginnery of the company. When the seed comes back, it is delinted, using 1 l sulfuric acid for 12 kg seed and a concrete mixer[1]. In 2020, the farm will plant 105 ha of DP 90 (US) and 250 ha of Claudia (Australia). 4 varieties are multiplied as basic seeds after testing on the farm: Claudia, DP 90, Werer50 and Weito7, the last two in small quantities. An adaptation trial is conducted with research every year. The breeder and the other scientists visit the trial every year to monitor. The seeds produced by the farm (about 150 tons) are stored for selling to other farms (mostly large farms), in Afar and in other regions of the country (Fig. 7). The remaining 800 tons are sold for crushing.

[1] In Tanzania, the acid delinting plant managed by Quton is consuming about 25 kg of sulfuric acid per ton of fuzzy seed (density 1.83 g/cm^3), *i.e.* 18% of the quantity of acid used with the concrete mixers

Remark. The farm manager has a very good understanding and experience with seed production. Towards professionalization of the function?

Pests. The main insect pests are the Pink (*P. gossypiella*) and African (*H. armigera*) bollworms, Thrips and Mealy bugs. Pink bollworm is becoming a major pest, although it was almost inexistent when the farm started. To escape the pick attack, the farmer wants to plant earlier in 2020 (starting mid-March instead of mid-April). Pest control was not very effective in 2019. Compared to a yield of 4,5 tons/ha obtained in 2018, the early estimate of 5.5 tons could not be reached, and the final yield was only 3,3 tons/ha. Pests were controlled with chemicals such as Endosulfan and organophosphates (about 8 to 11 sprays). Completed with Molasses traps (5 to 40 moths every 4 days). Claudia was observed more susceptible to the pink bollworms than DP 90.

Challenges. The major challenges are pest control, input and chemical shortage, and water flooding. Also through the year, it was difficult to sell the 2019 crop (stored at the ginnery, could be a price pb). There are other farms in the surroundings. Large and medium. The nearest has not been active in cotton this year. Finally, although the cotton was hand-picked, it was not of very high quality, due to the pink bollworm (Fig. 8).

Figure 8. Typical aspect of seed cotton picked by casual labour.

- Organisation: **Hiwot Agricultural Farm Mechanization PLC**
- Date of the interview: **10/03/20**
- Place: **Neguara farm, Humera area, Tigray Region**
- Persons interviewed: Mr. Bahlibi GEBRU (bahlbigebrugg@gmail.com) and Mr. Gabretsadik GEBREGZIABHER

Company. It owns two farms for a total of 6000 ha grown with different crops (sesame, green gram, sorghum or cotton). One farm is located near Dansha and the other near Humera, at a 70 km distance. The same company also operates a ginning factory in Dansha (100 km from Humera) and a textile company (Almeda) in Adwa (320 km) that spins open-end and ring. The importance of cotton planted on the farms may vary between 15% and 49% of the farms, depending on rainfall and market predictions. In 2019, 2011 ha were planted for an average yield of 1,2 - 1,4 ton SC/ha. Better staple length in Awash. The ginning plant is also buying 4500 tons from the outgrowers, whilst Almada textile company is replenished for 80% by the two farms and 20% from market.

Cropping system. Rainfed. Large open fields with almost no tree or edge. Limited infrastructure. Seeds are mostly broadcasted. Fertilizer is applied at 100 NPS/ha, and 50 kg Urea. Fabrics bags are used for picking, and jute bags for transport. Few small scale farmers are growing cotton, but the company is also buying from outgrowers at the ginnery or on the farm. There is a plan to mechanize more, specially planting, and to change from broadcasting (50% of the farm and all outgrowers in Gambela and Amhara regions) to row planting.

Varieties. Acala SJ2 since 23 years, DP 90 since 4 years (basic seeds from Werer research center), and this year Claudia (provided by Solidaridad). Acala SJ2 produces in short season, on lands which dry faster, as it is indeterminate growth continues branchy if late rains, but is fiber is rather short (26-28 mm): it tends to be eliminated. DP 90 produces more than Acala in longer seasons and on good land, its fiber is also short (26-28 mm) with a GOT of about 38%. Claudia has been introduced on 24 ha for testing in 2019 and the area will be increased in 2020 as its GOT is much higher (should be at least 42-44%). The varieties are supposed to be productive (SC yield as well as GOT), early maturing and with a good staple length.

Pests and diseases. No disease (bacterial blight may have affect production in September 2016). Pests, flea beetle (altises golden), African Bollworm, jassids, few pink bollworms or mealy bugs. The pesticides presently used are pyrethroids (FASTAC / Alphamethrin; Deltamethrin; Karate / lambda-cyalothrin), and an organochlorate (Endosulfan).

Seed production. The farm has been preparing seed for outgrowers for 20 years. Preference goes to Acala SJ2 in Humera, where the season is shorter, elsewhere DP 90 is favoured. For the last 5 years, Werer research station has supplied 1.2 ton of breeder's seed to produce basic seeds. The basic seeds are grown on better lands with better agronomic practices to secure a good yield (1.6-2.4 tons of SC/ha). To be used for seed production,

the plots of the farm must not have been affected by too many pests attacks. Their production is ginned aside, after cleaning of the plant, the seed are delinted (concrete machine), and dressed on demand with Cruiser. The seed are tested for germination (blotting paper in a tray). 30 to 60 tons of seed are produced for the farms and, depending on the demand), from 30 to 140 tons can be produced for the outgrowers.

Remark. With the amount of breeder's seed supplied by WARC (1.2 ton), the quantity of pre-basic seed which can be produced varies between 60 and 200 tons. The high multiplication rate (50 to 165) does not provide a big margin in hazardous years.

Challenges. Market availability, shortage of chemicals (including herbicides). Need for more research on weed control (test herbicide) and pesticides.

Remark. Both farms share similar situations. Very limited investments have been done whether in buildings, welfare of the personnel or the land (less edge, few tree). On the contrary, it seems that such major agricultural actors should demonstrate the way to sustainable agriculture, that maintains soil fertility through landscape management instead of mining the land.

Small scale producers

- Organisation: **Hadnet Farmers Cooperative, under Dansha Union**
- Date of the interview: **11/03/20**
- Place: **Dansha, Tigray region**
- Persons interviewed: Mr. Mulu GEBREMARIAM (Agronomist, mgdaniana@gmail.com), Mr. Berhanu TESHOME and Mr. Tesfaye DESTA (Farmers)

Mr. Berhanu has been a cotton grower since 1975. It grows 0.25 ha out of a total land of 5 ha. His two oxen are used for ploughing and ridging while the cottonseeds are drilled by hand in rows. Row planting demands more labour (1 person to cultivate + 1 to apply fertilizer + 1 to plant). Fertilizer is applied at a rate of 60 kg NPS and 24 kg Urea / ha. He got yields of about 2 to 2.4 tons/ha.

Mr. Tesfaye has been growing cotton for about 10 years. It grows 0.25 ha out of a total land of 5 ha also. He plants cotton as a broadcast.

Dansha Union. It includes 60 cooperatives. It buys good quality seed cotton at 26 EB/kg, but only up to 10 tons. In Axum, there is a high number of weavers than are looking for very clean seed cotton and can buy at a good price (up to 30 EB/kg). They make traditional dresses which can cost up to 4000 EB.

Seed. They are now provided by the Union. Before, they were first supplied by the ginnery in Gondar, coated with mud (to prevent the seed from conglomerating), and later by the Dansha ginnery.

Challenges. In previous years, there were market failures. Today, main challenges are due to chemicals shortages (which can somehow be improved by mixing with holy water). Three chemical and two neem sprays[2] are applied. Molasses traps can also contribute to control the number of insects.

- Organisation: **Egrmitkal cooperative: under Dansha Union**
- Date of the interview: **11/03/20**
- Place: **Dansha, Tigray region**
- Persons interviewed: Mr. Mulu GEBREMARIAM (Agronomist, mgdaniana@gmail.com), Ms. Alemitu BEZABIH (farmer) and Mr. Guesh GEBREHIWOT (Farmer)

These small scale farmers are met in a village located on the road to Dansha hospital. They consider that 2 to 4 ha, if well managed, can be enough for the household to live on. They both grow cotton, sorghum, finger millet, tef and greengram, mostly for home consumption.

Ms. Alemitu has been growing cotton for 11 years. At the beginning, she was ginning manually her own cottonseed for planting. At that time, she used to select, before picking the commercial crop, the biggest bolls in her field to produce the seed for planting. Then, she got fuzzy seed from Hiwot Farm. Now (since 2 years), she is getting free delinted DP 90 and Claudia seeds from Dansha Union, with the support of the Non Govermental Organization (NGO) Solidaridad. She is broadcast planting on ploughed land. Ms. Alemitu plants cotton because she likes the crop and also she likes spinning, although the market is not attractive. She also got low yields (560 kg/ha first pick) because of late planting (26/06), as the tractor was not available to plant in due time this season.

Mr. Guesh has been growing cotton for 5 years, with seeds obtained from the ginnery. His yields average 1200 kg/ha. Symptoms of Fusarium wilt might have been detected in 2019. The price (26 EB/kg SC) is relatively good.

Seed. Supplied by the ginnery and, more recently, by Solidaridad. Fuzzy seed need twice as many seed as delinted. They are also more difficult to handle (they stick in bunches) and the germination rate is lower.

Ginner

- Organisation: **Dansha ginnery**
- Date of the interview: **11/03/20**
- Place: **Dansha, Tigray region**
- Persons interviewed: Mr. **BERANE** (Director, mbirgeb64@gmail.com)

Plant. The gin is equipped with two Continental 141 saw-gins, without any lint cleaner, having a capacity of 30,000 tons/year. It operates at about 38 to 39% of fiber. Humidification is needed in the month of March and April only. At present, it rather gins at one third of its capacity. Beyond the cotton produced by the two farms attached at the ginnery, it also buys seedcotton at 19 EB/kg, or gins for other farms.

[2] 750 g of dried leaves in 100 l of water. Quite tedious for big fields.

Seed. It produces about 300 tons of seeds delinted and dressed, the crushing seeds being processed around Addis. Seeds are ginned, acid-delinted in a concrete mixer, dressed with Cruiser (Imidachloprid) and stored separately in 50 kg pp bags. There is a room to conduct germination tests in a dish covered with soft paper (Fig. 9).

Trashes. Although cotton is hand-picked everywhere, the foreign matter content is generally higher in the large farms production, where cotton is picked by casual labour, and the small farms, where quality is better monitored.

Figure 9. Various aspects of the work done by the ginnery. From left to right and top to bottom. Separation of the cotton seed lots according to their geographic origin and destination. Unloading of seed cotton for ginning. Quality control on seed at the lab (see the yellow germination tray). Fiber and seed quality control of the seed cotton before ginning.

Private sector

- Organisation: **Ethiopian Cotton Producers, Ginners and Exporters Association (ECPGEA)**
- Date of the interview: **6/03/20**
- Place: **Addis**
- Person interviewed: Mr. Asefa **AGA** (Executive secretary, asefaaga@yahoo.com)

Figure 10. The two experts with the Mr. Aga.

ECPEGA. It is a business membership organization. Its mission is to lobby for its members, and to provide information (technical) to them. The Board is composed of 11 members representatives of the 6 main cotton producing regions, ginneries, cooperatives, commercial farms, and middle range unions.

Seed system. It does not exist formally. Cotton is not covered by the national seed agency and there is no seed enterprise for the commercial crops. No cotton act. No regulation, and no restriction to the circulation of seed in the country or to the importation of seeds for yourself. Some commercial farms start to produce, gin and delint seed for themselves (Amibara). Then they also sale to small holders (Amibara, Lucia). They are attached to a ginnery (selection of lots from their own production). They can also be operators / traders that buy seed cotton to produce seeds. They are sold at the price of 60 EB / kg. There is no traceability at all, however small farmers don't complain. Seed delinting is not always properly handled (losses) but the seed are seldom tested for quality and germination.

Remark. The loose regulation of the cottonseed sector may be due to the double mentorship of the cotton chain by two different Ministries, Agriculture and Industry, without a clear definition of responsibilities.

Varieties. Two varieties, Deltapine 90 (from US), maintained by research and preferred by farmers, and Acala SJ2. Both are recommended for rainfed and irrigation. Research has produced (or introduced) 35 varieties but none of them competed with DP until now. To be marketed, all varieties have to go through a Variety trial Committee. Bt cotton is not allowed (and expensive) for cultivation but it is probably grown in the borders of Sudan.

Support institutions

Cotton sector coordination

- Organisation: **Ethiopian Textile Industry Development Institute (ETIDI) - Ministry of Trade and Industry (MTI)**
- Date of the interview: **6/03/20**
- Place: **Addis**
- Persons interviewed: Mr. Messele MEKURIA (D/Director General, meselemekuria8@gmail.com), Mr. Samson ASEFA (Director, Cotton Development, samsonasefa94@gmail.com)

ETIDI. The institute has a central role for the cotton sector. It has recently been transferred from the Ministry of Agriculture to the Ministry of Industry, to link with job creation in the textile sector. It has 16 technical experts organized in 4 teams (Agronomy and research / Extension / Irrigation / Economics & Mechanization). Its role is to assist small holders and cotton producers, in relation with the extension services, based in the regions. It delivers training of trainers, or capacitate employees of the big farms, in the field of agronomy (3 days), crop protection, training method, farm management or planning (for big farmers), farm machinery or oxen-drawn equipment.

Facilitation and coordination role. ETIDI is playing a role in the imports (chemicals, fertilizers…), labour, and policy issues. It coordinates the importation of chemicals (shortage in $), and organizes meetings with SH on quality, chemicals and the seed system: research provides pre-basic while ETIDI recommends to the Ministry of Agriculture the farmers that deserve to be registered and be issued a certificate of competence. The institute is also managing at its HQ in Addis a HVI laboratory to characterize the fiber, affiliated to a round test coordinated by USDA.

Cotton production. Cotton is grown in 6 regions, Afar, Amhara, Benishangul-Gumaz, Gambela, South and Tigray. There are commercial farms or smaller farmers who are gathered in Cooperatives and Unions. Some SH are conducting contract farming: ginneries, textile mills (Kombolcha), unions (which benefit of inputs). The potential for cotton growing is 3 M. ha, both irrigated and rainfed, whereas it only reaches now a maximum of 100,000 ha. Most small-holders are producing in rainfed conditions, without fertilizer, in favorable conditions for organic cotton. Each year, the Ethiopian Industrial Input Development Enterprise (EIIDE[3]) buys some fiber on the local market to supply the textile industry, and the price for this transaction is based on a classing system which includes 11 parameters describing the fiber intrinsic quality and its cleanliness (see SOFRECO's report). This price provides an indicator for the other transactions passed throughout the country.

Major challenges. Cotton research has limited resources to improve the seed sector (underfunded, shortage of researchers, equipment, land), nor the capacity to generate sufficient basic seeds. All resources come from government. There are no complain from the industry regarding the quality, but there are wishes to get longer varieties. Among the issues to be addressed: seed dressing efficiency, shortage of chemicals and alternatives to Endosulfan or organophosphate such as Chlorpyrifos, GOT expected to be at 42%, and left-overs from high quality stocks produced by seed producers. The variety Claudia should fulfill some of the requirements.

[3] Created in 2014, by Regulation N° 328-2014. Its purposes are in particular 1/ to establish, administer and transfer, whenever necessary, enterprises which ensure supply of industrial input; 2/ to supply industrial inputs by manufacturing domestically and abroad; 3/ to supply industrial inputs by purchasing from the local and international market (…); 6/ to implement strong supply chain management to ensure dynamic and efficient industrial inputs delivery (…).

Cotton Research

- Organisation: **Werer Cotton Research Center, EIAR**
- Date of the interview: **9/03/20**
- Place: **Awash, Afar region**
- Persons interviewed: Mr. Merdasa BALCHA (Cotton program coordinator, balchamerdasa@gmail.com), Mr. Donis GURMESSA (donislw@gmail.com), Mr. Samuel DAMTEW (samueldt2@gmail.com)

The breeding team. The three scientists that we met are part of the cotton breeding team. Mr. Merdasa BALCHA is also coordinating the whole cotton program. He holds a MSc in Plant Breeding. He has a 3 years' experience as a junior researcher and 2 as a plant breeder. Mr. Donis GURMESSA holds a MSc in Biotechnology. He has a 9 years' experience in plant breeding. Mr. Samuel DAMTEW has a MSc in Plant Breeding, and a 6 years' experience in cotton breeding.

Cotton in Ethiopia. It is grown both by large-scale and small-scale farmers in the lowlands. It is rainfed in the regions of Tigrea, Amhara, Gambela, Benichangul-Gumuz, and irrigated in Afar and Awash, Oromia and South.

Research and breeding. Research is organized in four departments, Breeding, Socio-Economics and Extension, Agronomy, and Entomology. The breeding program conducts experiments with varieties introduced from other countries, and also does conventional breeding: crosses (not enough genetic diversity), followed by selfing and visual single plant selection within each generation until F7 when the crop has fully opened. The promising lines are tested in (a) Preliminary trial (2 environments or years); (b) National variety trial (6 environments, 2 or 3 locations for 2 or 3 years in the Afar region); (c) Multi-location trial (6 locations with irrigation in Werer, Gewane / Afar, Shaleko / Afar, Omorate / South region, Sille / Southern region, Weyto / Southern region). Note that there is no research done for rainfed cotton.

Varieties. Several varieties have been obtained or introduced, tested and registered in the National Variety Register. 30 years after their release, DP 90 and Acala SJ2 are still commercially grown everywhere in Ethiopia. However, today, the preference of the growers is going to the variety Claudia, which is under testing and multiplied both in irrigated and rainfed areas. This variety shows a good balance with a yield potential superior to the old varieties, very high GOT and rather exceptional fiber length. The variety Sisikuk or Malkasadi have been bred by WARC, released in 2015 and 2019, and could be an alternative to Claudia. Finally, two *G. barbadense* varieties have also been released in 2019 (WARC-LS1 and WARC LS2): Their fiber length exceeds 33 mm but their yield remains below 25 q/ha and their GOT below 38%. JK GMO varieties have been introduced from India and tested, but their cost is too high considering their productivity (table 2).

Table 2 – Recent varieties mentioned in the 2018 Crop Variety Register (results communicated by WARC, EIAR with no indication on how the results were obtained)

Variety	Registered	Year	Origin	Yield q/ha	GOT %	FL mm	Comments
Malkasadi	WARC	2019	Ethiopia	46.8	38.4	29.1	Local breeder
JKCH 1947	JK Agri Genetics	2018	India	30.6	39.4	27.8	Bt cotton, imported
JKCH 11050	JK Agri Genetics	2018	India	30.5	39.2	28.4	Bt cotton, imported
Sisikuk	WARC	2015	Ethiopia	40.7	44.8	28.8	Local breeder
Werer-15	WARC	2015	Ethiopia	43.0	39.0	27.7	Local breeder
STG-14	EAID PLC	2014	?	38.8	42.7	30.0	Imported ?
Candia	EAID PLC	2014	Australia ?	40.6	44.1	29.0	Imported Turkey
Claudia	EAID PLC	2014	Australia ?	38.4	45.7	30.9	Disseminated
DP 90	Deltapine	1989	USA	38.6	34.8	27.7	Commercial
Acala SJ2	USDA	1986	USA	32.5	34.2	28.6	Commercial

Superior characteristics in yellow

Remark. One could consider that WARC conduct at least two different breeding programs, one for irrigated and one for rainfed, including some sites in the rainfed area for the with a National Vairety Trial. Prior to develop any breeding activity, the breeders have to clarify their strategy in a Set of Specification (table 3). One could also refer to Sekloka and al (2008), for considerations on cotton breeding for rainfed condisions.

Table 3. An example of Set of Specification (SoS) for the development of a cotton variety in Benin.

Items of the SoS	Description
Breeding objective	A cotton variety adapted to sowing as a second cycle crop (after maize or cowpea), rainfed, mechanised, high planting density, with GOT and quality equal to the commercial variety, for the Savalou region (Benin) where labour is becoming scarce (mechanical harvest)
Breeding criteria	Fast settling, short internodes, reduced height, limited vegetative growth, grouped boll opening, GOT superior to 44%, seed index superior to 8,5g, length > 27,5 mm, Micronaire > 4,2, +b < 10, tolerance to Bacterial blight and Jassids (hairiness)
Evaluation criteria	Levels acceptable in comparison with the commercial variety
Resources	Germplasm: MAR, Chaco 520, Rockett (*etc.*), and local varieties Finance: they must be guaranteed by the client-partners for the course of the program, at least 10 years Others (land, analysis of fiber, *etc.*): …

Not relevant for Ethiopia

Breeding. For the irrigated cropping system, yield is the first criteria, as there is no premium for quality. The program starts to take harvest mechanization into account (compactness, short plants, uniformity of opening and maturity), but there is at present no harvesting machine to test for real. The program maintains a germplasm of 800 to 1000 varieties (renewed every two year). The ETIDI HVI laboratory is providing, free of charge, to the program, the analysis of 500 to 1000 samples each year. However, this is not enough to test single plants.

Relation with stakeholders. It is mainly organized in the frame of the annual research review forum. A team specialized for extension is in charge of following R&D results in the Afar region (15 sites). Once a year, the research team is conducting some training for irrigated farmers.

Remark. To cope with the needs of the sector, cotton research has (a) to improve its communication with the beneficiaries and stakeholders, and (b) address the challenges of rainfed cotton. To do that we propose to develop more participatory activities, in particular with the cotton small and large scale farmers and especially those who are recognized in their community as cotton experts and innovative farmers. As examples of participatory work done in cotton research, one may refer to Lançon and al (2008) for the development of CMS as illustrated in Figure 11, and to Lançon and al (2004) for the decentralized development of new varieties.

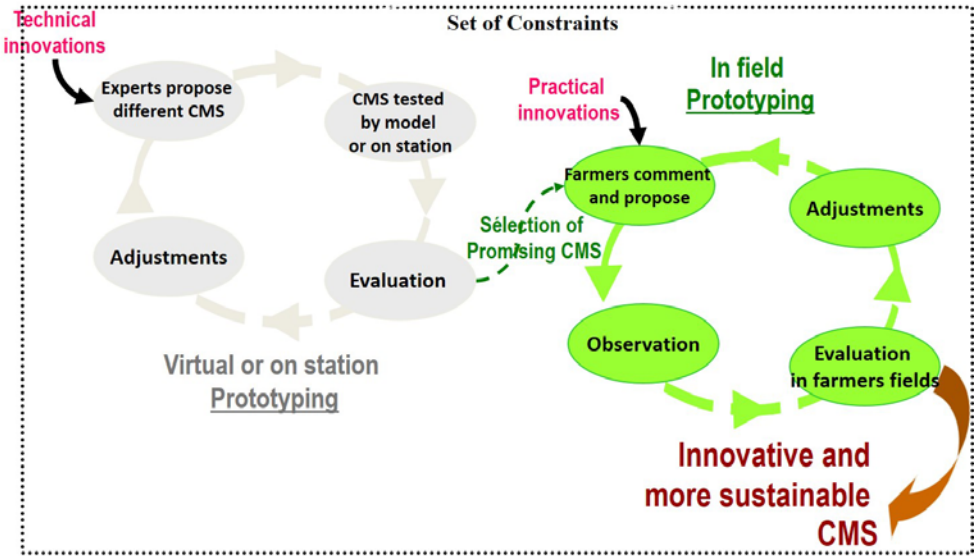


Figure 11. Two phases for the production of innovative and more sustainable Crop Management Systems (CMS), after Lançon et al, 2008.

Seed sector. The National Variety Release Committee is formed with 11 people, 2 representing the Ministry of Agriculture, 7 for the regional agricultural research centers (Tigray, South, Oromia, Amhara, Debrezeit, Melkassa), and 2 for Haramaya (Dire Dawa) and Hawasa Universities. The breeding program is maintaining the seeds (breeder's seeds) of major varieties by roguing[4] and selfing on 200-300 m² plots for each. It also produces 6-7 tons of pre-basic and basic delinted seed of DP 90, Werer-15, and Weyto-07. The seeds are sold to the farms involved in seed multiplication.

See picture

Challenges. First challenge is the budget that declines gradually, EIAR giving priority to food security. There are also some pest problems in the irrigated area (no test). The team cannot travel to the trial sites, in particular to South province. Lack of advanced breeding research and the new genetic material is not benefiting to the farmers. There is no control in the farms that produce the commercial seeds.

[4] Roguing means removing the plants with undesirable traits

Seed control

- Organisation: **Plant Health Regulatory directorate general - Ministry of Agriculture**
- Date of the interview: **12/03/20**
- Place: **Addis**
- Person interviewed: Mr. Mesfin Melaku (Acting Director of Plant variety release and seed quality control, mesafet02@gmail.com)

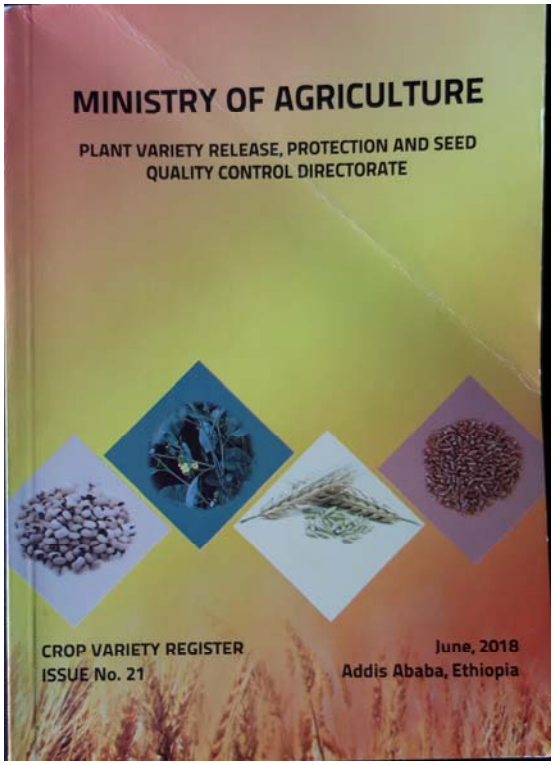


Figure 12. The 2018 issue of the National Varity Register.

Directorate. The Plant Health Regulatory directorate general has 3 directorates: plant, variety and seed quality control. In Addis, the Ministry of Agriculture has a national lab, which is accredited by ISTA. In the regions, 13 seed labs and inspection services are supervised by the MoA for harmonization purposes. In the cotton growing area, labs are present at Gondar (next to Humera, Dansha and Metema), Gambela, for the seed outgrowers, and Addis for Afar. However, the directorate has little – if none - activities on cottonseed multiplication and distribution, not even on the tags used by the seed producers which should be supervised by the seed inspectors.

Regulation. Concerning the seed sector, laws have been passed through the Seed Proclamation and Regulation (see Annex 3 and Annex 4), and the Plant Breeder's Right Proclamation … which is not yet functional. GMO is now free for cultivation (2 Bt cotton varieties were tested last year, see Table 1). A new variety, according to the seed regulations, can be introduced after it has been described (Distinction, Uniformity, and Stability or DUS criteria), and tested 1 year by WARC in an adaptation trial, and 2 years in a National Variety trial. A technical committee, composed of an agronomist, a breeder, an entomologist, and a biodiversity specialist, is in charge of producing a report for the National Variety Release Committee who will decide its registration in the National Variety Register (Fig. 12).

Legal documents

Seed Proclamation

- Author: **Federal government of Ethiopia**
- Date of the document: **02/2013**
- Content: **Seed act**
- Reference in bibliography

Organization of the Proclamation. General - Variety Release And Registration – Seed production and distribution – Quality control and assurance – Certificate of competence – Miscellaneous provisions

Definitions:

- “seed” for all plant propagating material intended for-planting;
- "approved seed" for seed certified as conforming to the Ethiopian seed standards;
- "Ethiopian seed standards" are set by the Ethiopian Standards Agency;
- "breeder seed" means seed of the first generation of seed multiplication, produced under the control of the breeder; following generations are "pre-basic seed" from breeder seed, "basic seed" from pre-basic seed and "certified seed" from first, second or third generation of basic seed;
- "quality declared seed" means seed produced by registered smallholder farmers, in conformity with the required quality standards;
- "release of variety" means permission by which a registered seed can be multiplied, produced or supplied to domestic market.

The Proclamation is not applicable to the farm-saved and forestry seed and their exchange or sale among smallholder farmers or agro-pastoralists nor to the seed used for research purposes.

Release and registration of varieties

- **Release.** A National Variety Release Committee (NVRC) set by the Ministry of Agriculture (MoA) proposes varieties for release based on the reports of evaluation committees;
- **Registration.** The released varieties enter the National Variety Register (NVR).

Production and distribution of seed

- **Certificate of competence.** Seed can be produced or distributed by entities that have a certificate of competence, based in particular on the ability to establish a seed quality control system. The holders of certificate have to keep samples of the seed tested during one year for possible inspection;
- **Authority.** The MoA delivers (and revokes) the certificates for any exporter, importer or seed actor operating in more than one region. Intra-regional business is managed by regional authorities.
- **Monitoring.** The MoA maintains a database on seed production (quantities, responsibilities, areas, register of producers and distributors) to facilitate integrated planning.

Quality control and assurance

- **Standards.** They are developed by the Ethiopian Standard Agency and the MoA, including for labelling;
- **Control.** All seed testing laboratories and their procedures are under the control of the MoA. The regional authorities deliver the certificates of seed quality for certified seed or quality declared seed for the domestic market while the MoA issues the certificates for imported or exported seed, as well as the permits;
- **Evaluation.** The seed imported for multiplication purposes have to be evaluated in “verification and adaptation trials” and listed by the NVRC in the National Variety Register. GMO seeds have to comply with the applicable legislation from the Environmental Protection Authority.

Seed inspection

- Seed inspectors are appointed by the Ministry of Agriculture and regional authorities to verify the compliance with the Proclamation, regulations and directives

Seed Regulation

- Author: **Federal government of Ethiopia**
- Date of the document: **02/2016**
- Content: **Seed Regulation adding to the Seed Proclamation**
- Reference in bibliography

Organization of the Proclamation. General - Variety Release And Registration – Seed production and distribution – Seed Quality Control and Assurance – Export and Import of Seed – Certificate of competence – Miscellaneous provisions

The present Regulation provides more information than the Proclamation.

Definitions:

- "National Performance Trial Evaluation Technical Committee" means a national committee established to perform technical evaluations and give recommendations to the National Variety Release Committee on applications to release a new variety;
- "seed lot" means a specified quantity of seed, which is homogeneous and physically identifiable.

Variety Release And Registration

- **Criteria.** They are based on distinctness, uniformity, stability and value for cultivation and use.
- **Register.** A variety registered in the National Variety Register will be recorded with several information such as the crop name, variety name, registration number, registration date, year of release, distinguishing distinctness, uniformity and stability trait and pedigree of the variety where applicable, conditions of release such as restricted, specific or wider adaptation, yield potential, adaptation, quality, disease and pest reaction; and name of person registering the variety or maintainer of the variety.
- **Adaptation and evaluation trials.** The Ministry of Agriculture is in charge of conducting the trials for a minimum of two seasons in at least three sites having similar agro-ecology or at least one season in related agro-ecological zone, for importation of a variety that has already been released outside of the Ethiopia.

Seed Quality Control and Assurance

- **Approved seeds.** A certificate of AS can only be delivered to seeds that have been inspected in the field, sampled and tested in accredited laboratory, properly tagged.
- **Quality declared seeds**. A certificate of QDS may be delivered to seeds that follow the same steps through an internal quality control process.
- **Labelling, information.** Certified seeds must be labelled with the name and address of the organization, the certificate number, the crop type and variety name, the seed class, a reference number, the net weight of seed, the year of production, date of sealing, expiry date and warning text if dressed with drug.
- **Labelling, color.** The labels are of different colors: a) for a breeder seed or pre-basic seed white color with diagonal violet stripe; b) basic seed with white color; c) first generation certified seed with blue color; d) second or successive generation of certified seed with red color.

Export and Import of Seed

- **Import.** Seed may be imported when it meets the Ethiopian seed standards and any other requirement set by the directive of the Ministry of Agriculture.

Cotton seed standards

- Author: **Ethiopian Standard Agency**
- Date of the document: **2012**
- Content: **Cotton seed-Specification (ES 441-2000)**
- Reference in bibliography

Organization of the document. Scope – Normative reference – Definitions – Requirements – Sampling – Packing – Labelling and marking – Compliance with the standard

Requirements

- **Sanitary aspects.** Cottonseed shall be free from contaminated, infested or infected seeds with *Ascochyta gossypii* (seedling or leaf blight); *Fusarium oxysporium* (wilt); *Xanthomonas malvacearum* (Black arm, angular leaf spot); *Glomerella gossypii* (Boll rot, anthracnose); and other seed borne diseases and parasitic weed seeds.
- **Inspection.** A minimum of two field inspection shall be made for all classes of seed production early at flowering and maturity

Standards are summarized in table 4.

Table 4 - Minimum requirements for cottonseed certification

Characteristics	A	B	C1	C2	C3	C4	E	Method of test
Field standard								
Rotation (min, year)	3	2	2	1	1	1	1	
Isolation (min, meters)	400	400	200	200	200	100	100	
Off types & other cultivar (max %)	0.01	0.02	0.03	0.05	0.05	0.05	0.1	
Laboratory standard								
Pure seed (min %)	99	98	98	98	98	97	97	ES 472
Other crop seed (max %)	0.5	0.1	0.3	0.5	0.5	0.5	1	ES 473
Weed seed (max %)	N.S	0.2	0.3	0.5	0.5	0.5	1	ES 472
Infected/infested/seeds (max %)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	ES 476
Inert matter (max %)	1	2	2	2	2	2	2	ES 472
Germination (min %)	85	80	80	75	75	75	70	ES 474 / ES 475
Verification of species cultivar	-	-	-	-	-	-	-	ES 477
Moisture content (max %)	8	8	8	8	8	8	8	ES 478

N.S = Not specified
A for Breeder/ pre basic seed; B for Basic seed; C1 to C4 for Certified seed; E for Commercial or Emergency class
ES 474: Germination test; ES 475: Biochemical test for viability; ES 475: Determination of Seed health

Plant Breeders' Right

- Author: **Federal government of Ethiopia**
- Date of the document: **02/2006**
- Content: **Plant Breeders' Right Proclamation**
- Reference in bibliography

Organization of the Proclamation. General Provision – Plant Breeders' Right – Transfer and Revocation of Plant Breeders' Right – Infringement of Plant Breeders' Right – Farmers' Right –Miscellaneous provisions

The present Regulation provides more information than the Proclamation.

Plant Breeder's Right

- **Right.** The holder is licensed by the MoA. He has the right to sell and produce, including the right to license other persons to sell and produce the seed or propagating material of the protected variety. The right shall exist for 20 years in the case of annual crops and 25 for perennial ones.
- **Breeding.** A protected variety can be used as an initial source of variation, in further breeding or research.
- **Exemption.** Any person or farmers' community may propagate, grow and use a protected variety for other uses than commerce, for use as a food, for use within a farm. However, farm-saved seed or propagating material of a protected variety cannot be sold in the seed industry on commercial scale.
- **Restriction.** The MoA may decide to put restrictions, against compensation, for various reasons, including prevention of monopoly, imported seed or food security.

Farmers' Right

- **Right.** Farmers have the rights to (a) save, use, exchange and sell farm-saved seed or propagating material of farmers' varieties; b) use protected varieties including material obtained from gene banks or plant genetic resource centres to develop farmers' varieties; c) save, use, multiply, exchange and sell farm-saved seed or propagating material of protected varieties.
- **Exemption.** Farmers cannot sell farm-saved seed or propagating material of a protected variety in the seed industry on commercial scale..

GMO Amendment

- Author: **Federal government of Ethiopia**
- Date of the document: **08/2015**
- Content: **Biosafety (Amendment) Proclamation**
- Reference in bibliography

Organization of the Amendment. List of modifications to the Biosafety Proclamation

- **Use and importation.** Any activity related to the release of GMO in the environment requires an agreement of the Ministry of Environment and Forest (MoEF), valid for ten years. A special permit is also required from the MoEF for importation, valid for 3 months, or contained use (such as field trial, in conditions to prevent unintended impact on human, animal or external environment), valid for 5 years.
- **NBAC.** A National Biosafety Advisory Committee is established by the government and accountable to the MoEF.

Strategic documents

Cotton sector scoping study

- Author: **SOFRECO**
- Date of the document: **10/2016**
- Content: **National Cotton Development Strategy (2015-2030) – Scoping study report**
- Reference in bibliography

The report presents a comprehensive view of the Ethiopian cotton sector. In this paragraph, we focus on specific information in line with the scope of our own study on the cottonseed sector.

Organization of the study. Project Rationale – Production and productivity – Processing and value addition – Competitiveness and market access – Value chain and organization and supporting services – Policy and regulation – Sustainable cotton production

Production

- **Farms.** The distinction between small, medium and large scale farmers are based on farm size, equipment, infrastructure, labour and business models (table 5).

Table 5 – Typology of cotton farmers in Ethiopia

Type	Farm size (ha)	Machinery	Buildings	Organization	Services supplied	Business model
Small	<30	-	-	Family	-	SC to coops or traders
Medium	30-200	1 tractor	Storage Shed	Family business	Ploughing	SC or lint
Large	>200	Several tractors	Storage Workshop Management	Manager Permanent and casual workers	Contract farming	Lint after commission ginning

Source CBE and DBE financing criteria

- **Trends.** Most of the cotton is produced in 1000 large scale farms (table 6). These farms generate a significant level of employment (2.7 p./ha), which is relatively comparable to the small farms (2.4 p./ha). They are managing 95% of the irrigated lands, but they are also growing cotton in the rainfed areas. In average, they have planted about 50-60 ha of cotton during the 2011-2015 period. During the same period, the small scale farms have grown around half a hectare of cotton.
- **SC yields.** The yields obtained by the small farmers are quite similar to those obtained by the large scale farmers under irrigation, but they are estimated to be inferior by about SC 0.3 to 0.4 ton/ha in rainfed conditions as compared with SC 1,70 ton/ha;

Table 6 – Cotton production in Ethiopia (average 2011-2015 and 2014-2015 for % irrigation vs rainfed)

Region	Area (ha)	Yield (ton SC/ha)	% Area managed under			
			large scale	small scale	irrigation	Rainfed
Amhara	27831	1,59	39%	61%	9%	91%
Tigray	12397	1,47	93%	7%	-	100%
Benishangul	6229	1,54	100%	-	-	100%
Gambela	5653	1,46	100%	-	-	100%
Afar	16734	2,22	84%	16%	100%	-
SNNPR	10769	1,76	73%	27%	64%	100%
Oromia	212	2,10	100%	-	100%	100%
Together	**79826**	**1,70**	**70%**	**30%**	**26%**	**74%**

After SOFRECO's report

- **Pests.** The main ones have been identified as mealy bugs (*Pseudococcidae solenopsis*), bolloworms (*Helicoverpa spp.*), flea beetles (*Podagrica sp.*), aphids (*Aphis gossypii*), whitefly (*Bemisia tabaci*) and jassids (*Empoasca lybica*);
- **Seed constraints.** The farmers identify several difficulties related to seed. Lack high yielding and long lint varieties and salinity problems for irrigated systems. Rainfed cotton depends on a single variety released for irrigated areas. Lack of appropriate seed source and use of fuzzy seed from unknown source for the small scale farms. More general, lack of coordination agency for the sector.

Processing and value addition

- **Ginning.** The commercial GOT is 36% as compared with 42% West Africa. On the other hand, ginning capacity is inadequately distributed (often, long distances to transport the raw cotton to the ginneries)
- **Business models.** Three major business models: a majority of self-standing and farm-integrated units, and a fully integrated model (from farm to garment, such as the ELSE Addis Development Industrial PLC). The contract farming model between the textile industry, the ginners, and the farmers is poorly developed mainly because rainfed production is at risk

Competitiveness and market access

- **Lint export.** The demand for lint is going to remain in China, Vietnam, Indonesia, Bangladesh or Turkey; to access this market, Ethiopian cotton has to be competitive with Brazil or West Africa (low contamination, homogeneity, high grade and long staple length) and a decentralized quality control process has to be developed from the field to the gins and the industry.
- **Garment export.** 80% is going to Europe where standard such as BCI, CMiA, or organic cotton may be valued; there is also an international market for handloom textile which is in demand of raw cotton for high counts (see report for more information p. 109-111).
- **Domestic market.** Finally, the domestic market offers a good opportunity both for industrial and handicraft textiles (Fig. 13).

Organization and policies

- **Cotton seed:** seed production and supply are considered as poorly organized, most of the seed being supplied by a few large farms using the same seed from year to year. A seed certification system should involve the cotton research centre, private breeders and the seed multiplication farms.
- **Cotton breeding:** the breeding program was launched in 1970 to improve the level of resistance to Bacterial blight and the fiber quality. Today, besides WARC, five other research centers (RC) are involved in the National Adaptation Trial *ie* Asossa RC (Benishangul region), Humera RC (Tigray), Gondar RC (Amhara), Abobo RC (Gambela) and Gode RC (Somali).
- **Challenges:** limited cotton genetic resources from abroad and lack of varieties (i) with long and extra-long fiber (*G. bardadense*); (ii) for rainfed cotton growing areas; (iii) resistant/tolerant to biotic (diseases and pests) and abiotic (salinity, drought and temperature) stresses; and (iv) suitable for mechanical harvesting.
- **Needs:** (i) fibre quality testing facilities; (ii) ginning machine and seed processing facilities; (iii) cold store for keeping germplasms; (iv) well-trained research staff; (v) more testing sites; (vi) better linkage with the textile sector; (vii) better links with international cotton organizations.

Figure 13. Demonstration of manual spinning for the handicraft sector (left) and final product (right).

Sustainable cotton production

- **On large scale farms.** The large scale commercial farms are often managed to get short-term profits from the investments made. The farming system exploits the natural soil fertility (volcanic black soils) without considering sustainability. Most of these farms also don't consider the management of trees in (or around) the fields for environmental protection and biodiversity. Some of them are even engaged in charcoal production while clearing the forest, and in places, local communities are being pushed towards National Parks (*eg* Mago, Hamar & Bana National Parks), with dramatic impact on the game population. Better practices, including conservation agriculture, should be recommended.
- **GMO.** With the Biosafety Amendment adopted by the Ethiopian government in 2015, it is possible to import GMO varieties for contained use, with an authorization delivered by the Ministry of Agriculture, which will be assisted by a National BioSafety Advisory Committee.
- **Risks.** The GMO seed are generally about 3 times as expensive as non GMO seed. The figure 5 shows why their introduction makes the crop more risky for the farmers, especially in rainfed conditions. With GMO seed, most of the cost of protection against the pests is spent at the beginning of the season. This may become a burden for the farmer if the crop has to be abandoned or to be sown again due to climatic hazards.

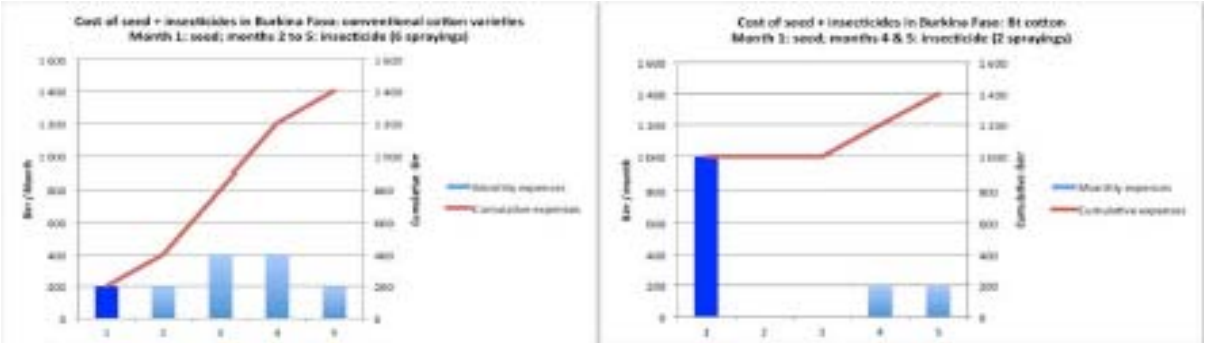


Figure 14. With traditional cotton (left), the spendings are distributed along the growing season, whereas with GMO cotton (right), the major spending occurs at the planting time (SOFRECO, 2015).

Cotton sector review

- Author: **Samson ASSEFA (ETIDI)**
- Date of the document: **11/2019**
- Content: **Overview of the Ethiopian Cotton sector**
- Reference in bibliography

ETIDI is collecting data production from the whole Ethiopian cotton sector, and this presentation is updating some of the information provided earlier in the document.

World cotton figures – History and importance of Cotton for Ethiopia – Potential, production and productivity of cotton – Cotton and mill use – Constraints and the future prospects

Production and use of cotton

- **Historical trends.** During the 70ies, cotton was grown on about 140,000 ha. The area then dropped to about 40,000 ha from the mid 80ies to the beginning of the century, where the sector raised interest of private investors and entrepreneurs (2003-2004) . After another drop due to poor international prices, the area planted is now fluctuating around 75 to 80,000 ha, depending on the relative price of lint and inputs (Figure 6).

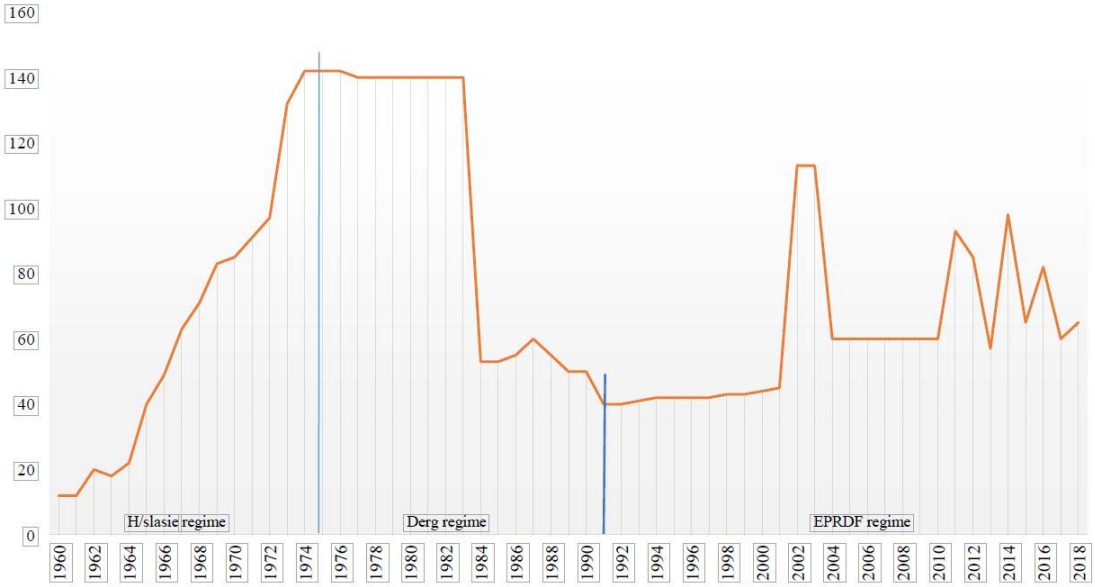


Figure 15. History of cotton planting in Ethiopia (S. Assefa, 2020).

- **National figures.** From table 7, it can be seen that the cotton production has been rather declining along the recent years. One can also compute that large farms are able to adjust the area planted with cotton to a greater extend (from a maximum of 68,610 ha in 2014/15 to a minimum of 34,406 ha in 2017/18) than small farms (from 29,968 ha in 2014/15 to 19264 ha in 2018/19).

Table 7 – Cotton production in Ethiopia from 2014/15 to 2019/20 (estimate)

Year	Area (ha)	Yield (kg fiber/ha)	% Area managed under			
			large scale	small scale	irrigation	rainfed
2014/15	98,578	667	70%	30%	-	-
2015/16	65,285	651	57%	43%	-	-
2016/17	79,805	674	66%	34%	-	-
2017/18	60,638	676	63%	37%	-	-
2018/19	58,373	-	75%	25%	-	-
2019/20	50,196	-	62%	38%	32%	68%
Together	**68,813**	**667**	**66%**	**34%**	**32%**	**68%**

After ETIDI's presentation

- **Industry.** Spinning capacity of 100,000 tons of fiber and another 100,000 tons in the pipe.

Constraints and challenges

- **Constraints and challenges.** Seed are limited in use, availability and quality; poor cotton quality; low GOT.
- **Future prospects.** Increasing local demand by the textile industry; priority given to the national textile industry; the National Cotton Development Strategy (NCDS) aims at improving the competitiveness and profitability of the cotton sector, and increasing the acreage grown, the productivity and the quality of the cotton produced.

Cotton development strategy

- Author: **SOFRECO**
- Date of the document: **12/2017**
- Content: **National Cotton Development Strategy (2018-2032) and Road Map**
- Reference in bibliography

The strategy has been derived from the scoping study also developed by SOFRECO. Here again, we focus on the aspects related to cotton breeding and seed production.

Organization of the strategy. Introduction – Overview of Ethiopia's cotton and textile sector – Global trends and international benchmarks – Ethiopia's potential and competitive constraints – National cotton development strategy (2018-2032)

- **Industry.** Ethiopia is the second larger consumer of cotton in Africa, net importer to satisfy the demand of the textile mills. The development of cotton production will be driven by the domestic spinning industry. Ethiopia has strong potential to expand its spinning sector to become one of the largest industrial users of cotton. The country has a significant potential for cotton production, and labour and power costs are relatively low.
- **Diversity.** No other country in Africa has the same potential as Ethiopia to grow a wide range of varieties, rainfed or irrigated, in different agro-climatic zones. Paradoxically, one single variety (DP 90) is currently grown on more than 90% of the cotton areas, the seed quality is quite low and the GOT is low by African

standards, which impacts profitability for both producers and ginners. Research is inadequate and underfunded.

Objective 3 – Environmentally and socially sustainable cotton

- **Large scale farms.** Improve the efficiency of Code of conduct implementation, correctly implement and monitor EMPs. Strengthen the capacities of national and regional structures to control implementation of code of conduct and best practices for investors. Perform regular audits on existing commercial farm. Assist investors to comply with Ethiopian legal, social and environmental requirements. The ginning outturn is very low by African standards, which impacts profitability for both producers and ginners.
- **Research.** Prioritize the development of heat- and drought- resistant seeds adaptable to various climatic systems in Ethiopia.

Objective 4 – Competitiveness and profitability

- **Seed.** Set up a formal supply system for certified cotton seeds through selected private producers closely linked to the research centres (G1 and G2 seeds)
- **Bt cotton.** Assess the pros and cons and explore the testing.
- **Research.** Capacitate the cotton research programme resource base (human, physical, and budget), and establish cotton research centers and sub-centres in major cotton producing regions of Ethiopia. Progressively increase (by 10-30% / year) the budget of the national cotton research programme. Develop new production and productivity boosting technologies (varieties, *etc*.) in all areas of cotton production. Revigorate the existing laboratories at WARC and establish and set up laboratories for the new centres.
- **Network.** Create a strong and functional linkage between key cotton actors nationally (MoA, MTI, Ministry of Environment, Banks, Custom Authority, Universities, BoA, *etc*.) and internationally (ICAC, A.C.A., ICA, PAPA, FAO, *etc*.).

Other documents

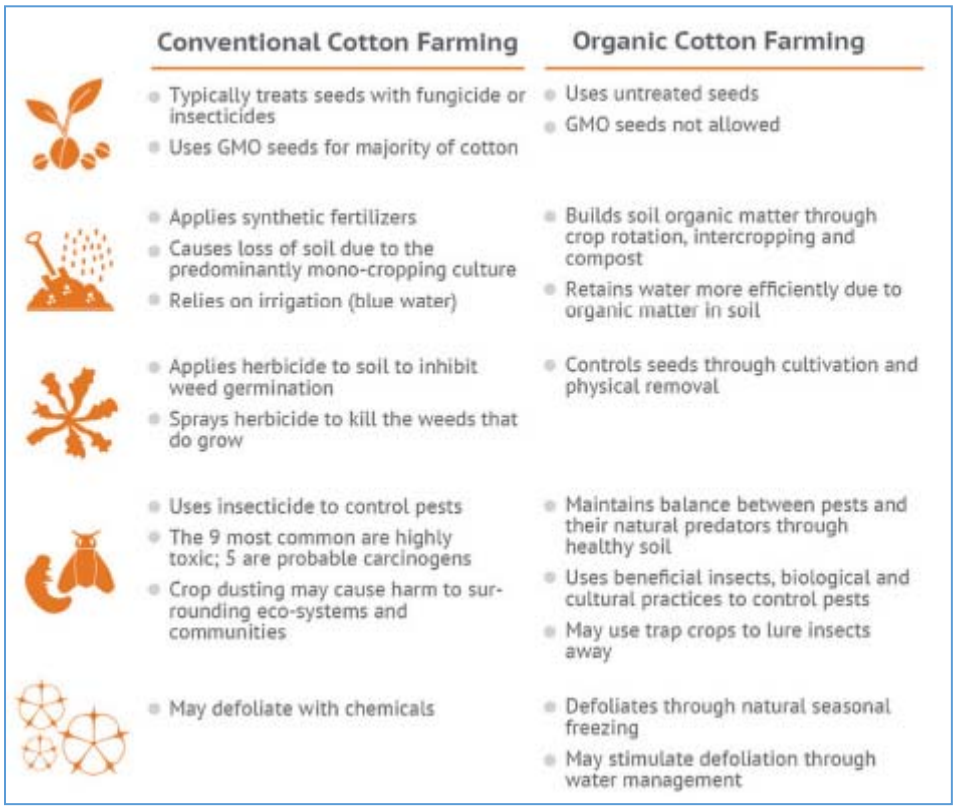
Cotton certification

- Author: **Öko-Institut e.V.**
- Date of the document: **10/2018**
- Content: **The cotton supply chain in Ethiopia – Final report**
- Reference in bibliography

Organization of the report. About cotton – Markets and cotton trade – Certification schemes and due diligence for cotton and textiles – The cotton supply chain in Ethiopia – Good practice downstream company examples – Conclusion and outlook

- **Certification schemes.** They represented in 2018, about 21% of the world wide cotton production, although 75% of this amount was sold as conventional. In 2016, the major schemes were BCI equivalency (78%) including CmiA (8.7%), Bayer e3 (17.9%), Organic (3.3%) and Fair Trade (1.3%). BCI and CMiA are specially attentive to the protection of biodiversity in the protected areas and the farms, to the maintenance of soil quality, water contamination, labour rights and food security. CMiA is not considering large scale farms.

- **Seed and organic cotton.** The figure below summarizes the main differences between organic and conventional cotton. Seeds must be untreated – at least with chemical dressing – and not GMO. It is not say about id if it should be delinted or not.



Source: aboutorganiccotton.org, an initiative by Textile Exchange

Cotton sector

- Author: **RFC Consulting**
- Date of the document: **12/2018**
- Content: **Cotton analysis in Ethiopia – Final report**
- Reference in bibliography

Organization of the report. Introduction – Cotton location analysis – Ginnery location analysis – Cross-cutting issues within the cotton value chain – Recommendations and conclusion

- **Seed.** Nothing about the seeds except that the NDCS intends to set a better seed system.

German cooperation

German Embassy

- Organisation: **Development cooperation, Embassy of Germany**
- Date of the interview: **6/03**
- Place: **Addis**
- Person interviewed: Ms. Laura SCHMIDT (Counsellor, Head of Development Cooperation)

The mission was presented to the Counsellor in the perspective of a more ambitious project that will be proposed by the Africa Cotton Foundation (ACF) , GIZ and Cirad at the continental level.

It was reminded that the Cotton made in Africa (CmiA) program that was put in place by the German cooperation was still active in Ethiopia, with limited EU funds. In Tigray (Humera) and Afar regions, it involved about 20,000 farmers that were producing 11,000 tons of SC (quarter of the total production).

Cotton in Ethiopia is mainly used by the local textile industry (90%).

Debriefing session

- Organisation: **GIZ Headquarters**
- Date of the session: **13/03**
- Place: **Addis, GIZ HQ**
- Persons present: Ms. Elizabeth VAN DEN AKKER (elisabeth.akker-van@giz.de, Program manager SDR-ASAL), Mr. Yared FEKADE (yared.fekade@giz.de, Special initiative for textile jobs)

Among the points raised and discussed during the debriefing, we especially noted:

Categories of farmers. Small own less than 10 ha, middle 10 to 200 and large scale more. The last two are generally included in the large scale category.

Challenges. Need to link the production activity (supported by MoA), to the textile industry (supported by MTI), in a market oriented perspective. Need also to better link the quality and the price (in particular no grading of fiber, and GOT not considered).

Cotton textile. Two categories are found in Ethiopia: i) fully integrated lines, from production to garment, including the handicraft sector; and ii) limited to the fabrication of clothes from imported fabrics. The locally produced yarn by open end has not the required quality for export, it causes too many breaks and shows defects during dying. In particular, the cotton produced in the Afar region is better considered that the one produced in Gambela, which is grayer. The GIZ project entitled “Special initiative Textile Jobs” has a component to help the two chains to merge (capacity building, certification and quality control, adoption of technologies, linkage with international buyers, German equipment …)

Remark. Representatives of the different categories of textile chains must be involved in the specification setting of new varieties (see table x). This may lead to the need for several breeding programs differing by their objectives and selection criteria. ir with and chains several specify their needs for specific uses.

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ANNEX 1. Detailed programme

Itinerary for the GIZ Consultant 5-14/03/2020

Date	Location	Activity	Time
5/03/2020	Montpellier	Departure of consultant	15.30
6/03/2020	Addis	Arrival of consultant	6.15
	Addis	Visit to GIZ	8.45
	Addis	Visit to the German Embassy	10.00
	Addis	Visit to the Ethiopian Cotton Producers and Ginners Association (ECPGA)	11.30
	Addis	Visit to the Ethiopian Textile Industrial Development Institute (ETIDI)	14.00
7/03/2020	Awash	Travel from Addis to Awash (4-5 Hrs)	13.00
8/03/2020	Awash	Travel to Gewane (2,5 Hr)	6.30
	Gewane	Visit the xxx farm	10.00
9/03/2020	Werer	Visit to the Werer Cotton Research Center	07.30
	Addis	Travel from Awash to Addis (5 Hrs)	14.00
10/03/2020	Addis	Flight to Humera (3 Hrs flight)	07.15
	Humera	Visit Farm	11.30
11/03/2020	Humera	Travel to Dansha (1 Hr)	08.00
	Dansha	Visit SS farmers Union	10.00
	Dansha	Visit Ginning Plant	17.00
12/03/2020	Humera	Flight to Addis	10.30
	Addis	Visit to the Plant Health directorate (MoA)	14.15
13/03/2020	Addis	Debriefing at GIZ HQ	09.30
	Addis	Internal debriefing of the mission	14.00
14/03/2020	Addis	Departure of the consultant	00.15
	Montpellier	Arrival of the consultant	10.00

ANNEX 2. Acronyms

ACA	African Cotton Association
ACF	African Cotton Foundation
AProCA	Association des Producteurs de Coton Africain
BB	Bacterial Blight due to *Xm* (*Xanthomonas axonopodis pv malvacearum*)
BCI	Better Cotton Initiative (more sustainable cotton)
BMZ	The Federal Ministry for Economic Cooperation and Development (Germany)
BoA	?
Bt	*Bacillus thuringiensis* (origin of the transferred genes)
Cirad	Centre for International Cooperation in Research for Development (France)
CmiA	Cotton Made in Africa
CMS	Crop Management System
DP	Deltapine (US breeding company)
DUS	Distinctness Uniformity and Stability (UPOV rules)
EAID	Else Addis Industrial Development PLC
EB	Ethiopian Birr (about 35 EB for 1 €)
ECPGEA	Ethiopian Cotton Producers Ginners and Exporters Association
EIAR	Ethiopian Institute for Agricultural Research
EIIDE	Ethiopian Industrial Inputs Development Enterprise
ETIDI	Ethiopian Textile Industrial Development Institute
FAO	Food and Agriculture Organization
FW	Fusarium Wilt due to *Fov* (*Fusarium oxysporum vasinfectum*)
GIZ	Association for International Cooperation (Germany)
GMO	Genetically Modified Organism
GOT	Ginning Out Turn
HQ	Head Quarters
HVI	High Volume Instrument (Fiber testing)
ICA	International Cotton Association (trade)
ICAC	International Cotton Advisory Committee
M.	Million
MoA	Ministry of Agriculture
MoEF	Ministry of Environment and Forest
MTI	Ministry of Trade and Industry
NCDS	National Cotton Development Strategy
NPS	Nitrogen, Phosphorus and Sulfur (fertilizer compound)
NVR	National Variety Register
NRVC	National Variety Release Committee
PLC	Public limited company
QDS	Quality Declared Seeds
R&D	Research and Development
SC	Seed Cotton
SNNPR	Southern Nations, Nationalities, and Peoples' Region
SOS	Set of Specification
SWOT	Strengths, Weaknesses, Opportunities and Threats analysis
UPOV	International Union for the Protection of New Varieties of Plants
USDA	United States Department of Agriculture
WARC	Werer Agricultural Research Center (EIAR)

ANNEX 3. Seed Proclamation (2013)

Seed proclamation (2013)

WHEREAS, Ethiopia's seed sector is vital to ensure the country's agricultural economic development and food security;

WHEREAS, it has become necessary to facilitate the introduction of improved seed varieties to the market;

WHEREAS, it is essential to ensure that the supply of quality seed is made available to fanners, agro-pastoralists and other seed users;

NOW, THEREFORE, in accordance with Article 55 (1) of the Constitution of the Federal Democratic Republic of Ethiopia, it is hereby proclaimed as follows:

PART ONE - GENERAL

1. Short title

This Proclamation may be cited as the "Seed Proclamation No.782/20 13" .

2. Definitions

In this Proclamation, unless the context otherwise requires:

1/ "seed" means true botanical seed, bulbs, tubers, cuttings, rhizomes, roots, seedlings or any other plant propagating material intended for-planting;

2/ "approved seed" means domestically produced or imported seed certified as conforming to the Ethiopian seed standards;

3/ "emergency seed" means seed of a known provenance that is intended to meet an acute seed shortage;

4/ "prescribed seed" means any seed that fulfills the minimum seed standard or to which the necessary quality control is undertaken and supplied to market or determined by directive of the Ministry to be issued hereunder to be supplied to market;

5/ "Ethiopian seed standards" means the minimum limits of germination, varietal purity, physical purity and other quality attributes of prescribed seed as set by the Ethiopian Standards Agency;

6/ "generation" means each successive multiplication cycle seed undergoes;

7/ "breeder seed" means seed of the first generation of seed multiplication, produced under the direct control of the breeder or his assigned representative;

8/ "pre-basic seed" means seed that has been produced from breeder seed;

9/ "basic seed" means seed that has been produced from pre-basic seed;

10/ "certified seed" means a direct descent seed from basic seed or a seed found in first, second and third generation of basic seed;

11/ “modified organism" means any biological entity which has been artificially synthesized, or in which the genetic material or the expression of any of its traits has been changed by the introduction of any foreign gene or any other chemical whether taken from another organism, from a fossil organism or artificially synthesized;

12/ "quality control" means the process of evaluating the quality of a seed for compliance with Ethiopian seed standards;

13/ "quality declared seed" means seed produced by organized and registered smallholder farmers or registered small holder farmers, in conformity with the required quality standards;

14/ "restricted seed" means seed prohibited from being marketed in, imported into or exported from, Ethiopia by directive of the Ministry;

15/ "variety" means plant grouping within a single botanical taxon of the lowest known rank that can be a) defined by the expression of the characteristics of a given genotype or combination of genotypes; b) distinguished from any other plant grouping by the expression of at least one of the said characteristics; and c) considered as a unit with regard to its suitability for being propagated unchanged;

16/ "Ministry" means the Ministry of Agriculture;

17/ "release of variety" means permission by which a registered seed can be multiplied, produced or supplied to domestic market;

18/ "region" means any state referred to in Article 47(1) of the Constitution of the Federal Democratic Republic of Ethiopia and includes the Addis Ababa and Dire Dawa city administrations;

19/ "regional authority" means the authority responsible for agriculture at the regional level;

20/ "person" means any natural or juridical person;

21/ any expression in the masculine gender includes the feminine.

3. Scope of Application

This Proclamation may not be applicable to a) the use of farm-saved seed by any person; b) the exchange or sale of farm-saved seed among smallholder farmers or agro-pastoralists; c) seed to be used for research purposes; and d) forestry seed.

PART TWO - VARIETY RELEASE AND REGISTRATION

4. Release of Varieties

1/ Any variety intended for domestic or export market shall be released by the Ministry before it is produced locally.

2/ The Ministry shall set up evaluation committees that evaluate from time to time the technical performances of candidate varieties, and a National Variety Release Committee that propose varieties for release based on the reports of the evaluation committees.

3/ The structures and the procedures of operations of the committees shall be prescribed by directive of the Ministry.

5. National Variety Register

1/ The Ministry shall enter varieties released in accordance with Article 4 of this Proclamation in the National Variety Register,

2/ The National Variety Register shall include a list of other persons appointed by the Ministry to maintain the genetic identity of the varieties and to undertake producing and marketing of breeder seeds in the event the breeders are unable or unwilling to perform those functions.

PART THREE - SEED PRODUCTION AND DISTRIBUTION

6. Seed Production

1/ Any person who intends to engage in commercial seed production shall have a certificate of competence.

2/ Any person engaged in commercial seed production shall establish an internal seed quality control system.

3/ Any seed producer holding a certificate of competence may, subject to any other applicable legislation, access breeder seeds, pre-basic seeds and basic seeds from registered varieties producing institutions.

7. Integrated Production Planning

1/ The production of seeds for domestic consumption shall be executed on the basis of integrated planning.

2/ The Ministry shall keep a seed production database containing: a) annual production plan and due responsibilities of actors; b) annual production of seeds, by type of seed, by producers and the aggregate; c) land, infrastructure and other resources used to produce seed; and d) any other information relevant to national seed production.

3/ The seed production database shall be part of, or attached to, the register of seed producers and distributors referred to in Article 9 of this Proclamation.

8. Distribution

Any person in order to engage in commercial seed distribution shall have a certificate of competence.

9. Register of Seed Producers and Distributers

The Ministry shall maintain a register of seed producers and distributers.

PART FOUR - QUALITY CONTROL AND ASSURANCE

10. Standards

The Ministry shall cooperate with Ethiopian Standard Agency in developing seed standards.

11. Seed Testing Laboratories

1/ The Ministry shall: a) facilitate the implementation of internationally recognized seed testing procedures by all seed testing laboratories in the country; b) establish the accreditation criteria of seed testing laboratories; c) establish or designate an internationally recognized seed testing laboratory; d) ensure that regional seed testing laboratories are in conformity with the acceptable standard.

2/ The regional authority shall facilitate the accreditation of regional seed testing laboratories.

12. Seed Quality Control

1/ The regional authority shall undertake seed quality control on seed produced in the region for domestic market.

2/ The Ministry a) shall formulate procedures for quality control of seed; b) shall verify the conformity of imported seeds with the Ethiopian seed standards; c) shall verify that the quality of seed produced for export market is in conformity with the standards of the recipient country; d) may recognize any foreign competent seed certification agency and the results of its tests when it ascertains that they are in conformity with the Ethiopian seed quality testing system.

13. Certificates of Seed Quality

1/ The regional authority shall, after ascertaining that seed produced and processed in the region for supply to the domestic market: a) is listed in the National Variety Register; b) has been produced and processed by a person holding a certificate of competence; c) has been tested in accordance with this Proclamation and found to be in conformity with the applicable Ethiopian seed standards; and d) fulfills any other requirement as may be specified by directive of the Ministry; upon payment of the prescribed fee in accordance with the regulation to be issued hereunder, issue a certificate of seed quality for certified seed or quality declared seed.

2/ The Ministry shall, after ascertaining that an imported seed: a) is listed in the National Variety Register; b) is imported by a seed importer holding a certificate of competence; c) has been tested in accordance with this Proclamation and found to be in conformity with the applicable Ethiopian seed standards; and d) fulfills any other requirement as may be specified by directive of the Ministry; upon payment of the prescribed fee in accordance with the regulation to be issued hereunder, issue a certificate of seed quality with respect to such seed,

3/ The Ministry shall, after ascertaining that seed for export: a) is listed in the National Variety Register; b) is produced and processed by a person holding a certificate of competence; and c) fulfills any other requirement as may be specified by directive of the Ministry; upon payment of the prescribed fee in accordance with the regulation to be issued hereunder, issue a certificate of seed quality with respect to such seed.

4/ Any certificate of seed quality may be revoked where: a) it is found to have been obtained on the basis of false, misleading or incomplete information; or b) the seed is found not to meet the applicable Ethiopian seed standards following a post-control conducted under Article 15 of this Proclamation or any re-testing of seed quality.

5/ Prior to revoking a certificate of seed quality, the Ministry or regional authority shall notify the holder of the certificate and give him the opportunity to be heard.

14. Labelling

No seed may be supplied to domestic or foreign market unless labeled in accordance with directive of the Ministry.

15. Post-Control

Irrespective of the fact that a seed is supplied to market upon obtaining a certificate of seed quality, post distribution samples shall be taken and laboratory test be conducted where there is a reason to suspect the non-conformity of the seed to the required quality standards.

16. Non-conforming Seed

1/ Where a seed fails to meet the applicable standards, it shall be downgraded or rejected.

2/ Any person whose seed has been rejected shall be given the option to: a) use it for re-planting in his own fields; or b) supply it for use as food or feed, unless it is found to be contaminated or otherwise unfit for such use.

3/ Where a rejected seed cannot be used pursuant to sub-article (2) of this Article, it shall be disposed of in accordance with directive of the Ministry.

17. Import and Export of Seed

1/ No person may import or export seed without an import or export permit issued by the Ministry upon fulfillment of the requirements specified by directive of the Ministry.

2/ Any variety of seed to be imported for multiplication purposes shall be subject to prior verification and adaptation trials as established by the National Variety Release Committee and shall be listed in the National Variety Register in accordance with this Proclamation. Provided, however, that for the purpose of strengthening agricultural export market the Ministry shall determine by directive the exceptional case of supplying to export market unregistered seed by multiplying or producing.

3/ Any seed with genetically modified organisms may be imported if the Ministry receives prior assurance of its compliance with the applicable legislation from the Environmental Protection Authority.

4/ No person may: a) import or export restricted seed; or b) import any seed containing terminator gene technology.

18. Supply of Emergency Seed

In case of an acute seed shortage in Ethiopia, the Ministry shall have the power to announce officially a seed shortage emergency and to authorize the supply of emergency seed to affected areas.

PART FIVE - CERTIFICATE OF COMPETENCE

19. Requirement of Obtaining Certificate of Competence

1/ Any importer or exporter of seed shall obtain a certificate of competence issued by the Ministry.

2/ Any producer, processor, wholesaler, distributer or retailer of seed shall obtain a certificate of competence from: a) the regional authority where his business is operated within the region; or b) from the Ministry where his business is operated in more than one region.

20. Issuance of Certificate of Competence

1/ The Ministry or the regional authority shall examine an application submitted for obtaining a certificate of competence to ascertain that the applicant satisfies the requirements prescribed by directive of the Ministry and issue, upon payment of the prescribed fee in accordance with the regulation to be issued hereunder, the certificate of competence in question.

2/ When any application for a certificate of competence is rejected, the Ministry or the regional authority shall communicate same to the applicant by stating the reasons thereof.

3/ The duration of validity of certificates of competence and conditions of their renewals shall be prescribed by directive of the Ministry.

21. Suspension and Revocation of Certificate of Competence

1/ Where any person holding a certificate of competence: a) fails to maintain the conditions on the basis of which the certificate of competence was issued; or b) contravenes any provision of this Proclamation or regulation or directive issued hereunder; the Ministry or the regional authority may suspend the certificate of competence and instruct the holder to rectify the irregularities within a specified reasonable period of time .

2/ The Ministry or the regional authority may revoke any certificate of competence where the holder of the certificate: a) is found to have obtained the certificate of competence upon presentation of false evidence; b) in the case of suspension under sub-article (1) of this Article, fails to rectify the irregularities within the specified time limit; or c) has committed an offence under Article 26 of this Proclamation.

3/ The Ministry or the regional authority, upon revoking a certificate of competence, shall notify same, in writing, to the authority that issued a business license on the basis of the certificate in question.

22. Records and Access to Information

Any holder of a certificate of competence shall:

1/ record and keep particulars of each field and seed produced, processed, imported, exported, distributed or retailed, as the case may be;

2/ keep samples of seed on which laboratory test have been made for at least one year; and

3/ furnish such information and samples upon request by an inspector assigned under Article 23 of this Proclamation.

PART SIX - MISCELLANEOUS PROVISIONS

23. Seed Inspection

1/ The Ministry and each regional authority shall appoint seed inspectors to ensure compliance with this Proclamation and regulations and directives issued hereunder.

2/ Any seed inspector assigned pursuant to sub-article (1) of this Article may: a) take seed samples to make laboratory test in order to determine that a seed conforms to the applicable Ethiopian seed standards; b) require the production of and inspect certificates, permits, records and other documents relevant to ensure compliance with this Proclamation and regulations and directives issued hereunder, and make copies thereof; c) enter, at working hours, any field, store or seed processing plant, or at any time stop a vehicle which carries seed, and undertake inspection to verify compliance with this Proclamation and regulations and directives issued hereunder.

3/ Any seed inspector shall show to the concerned person the identity card issued to him by the Ministry or the regional authority to undertake seed inspection pursuant to sub-article (2) of this Article.

4/ The concerned person shall cooperate with a seed inspector in the course of seed inspection undertaken in accordance with sub-article (2) of this Article.

5/ The Ministry shall ensure standardized inspection procedures throughout the country and provide inspection training and support to regional authorities where necessary.

24. Federal and Regional Governments Cooperation

The regional authorities shall collaborate with the Ministry and among themselves to ensure uniform application of this Proclamation and regulations and directives issued hereunder.

25. Grievance Procedure

1/ Any person aggrieved by decision made in accordance with the provision of this Proclamation may apply to the Ministry or regional authority within 30 days of knowing such decision.

2/ Any person who is unsatisfied by the decision of the Ministry or the regional authority may appeal to the concerned justice organ within 30 days.

26. Offences and Penalties

1/ Any person who: a) supplies to the domestic market any seed not registered and quality controlled in accordance with this Proclamation, or which does not meet the applicable Ethiopian seed standards; or b) gives anything of value to cause the commission of fraudulent act in the course of production, processing,

marketing or quality control of seeds; shall be guilty of an offence and be punishable with rigorous imprisonment from five to ten years and with a fine from Birr 50,000 to Birr 100,000.

2/ Any person who: a) presents wrong seed sample for testing; b) tampers with any sample taken under this Proclamation; c) gives false information in making any application under this Proclamation; d) fails to observe the labeling provisions under Article 14 of this Proclamation; or e) alters, defaces, or removes any register, certificate, label, or other official record created or issued under this Proclamation; shall be guilty of an offence and be punishable with rigorous imprisonment from three to five years and with a fine from Birr 30,000 to Birr 50,000.

3/ Any person who: a) refuses to cooperate with or obstructs the work of a seed inspector exercising his powers under this Proclamation: or b) contravenes other provisions of this Proclamation; shall be guilty of an offence and be punishable with imprisonment up to one year and with a fine from Birr 5,000 to Birr 10,000.

4/ Any official or personnel of the Ministry or a regional authority who in exchange for value or due to kinship or other personal relationship, causes the registration of a variety or the issuance of a certificate or import or export permit while the requirements provided under this Proclamation, or regulations or directives issued hereunder are not met shall be guilty of an offence and be punishable with rigorous imprisonment from ten to fifteen years and with a fine from Birr 20,000 to Birr 50,000.

27. Power to Issue Regulation and Directive

1/ The Council of Ministers may issue regulations necessary for the implementation of this Proclamation.

2/ The Ministry may issue directives necessary for the implementation of this Proclamation and regulations issued under sub-article (1) of this Article.

28. Repealed Laws

The Seed 'Proclamation No. 206/2000 is hereby repealed.

29. Effective Date

This Proclamation shall enter into force on the date of publication in the Federal Negarit Gazette.

Done at Addis Ababa, this I5th day of February, 2013.

Signed GIRMA WOLDEGIORGIS, PRESIDENT
OF THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

ANNEX 4. Seed Regulation (2016)

Seed regulation (2016)

This Regulation is issued by the Council of Ministers pursuant to Article 5 of the Definition of the Powers and Duties of the Executive Organs of the Federal Democratic Republic of Ethiopia Proclamation No. 916/2015 and Article 27 (1) of the Seed Proclamation No. 782/2013.

PART ONE – GENERAL

1. Short Title

This Regulation may be cited as the "Council of Ministers Seed Regulations No. 375/2016".

2. Definitions

In this Regulation unless the context requires otherwise:

1/ "Proclamation" means the Seed Proclamation No. 782/2013;

2/ the definition provided for under Article 2 of the Proclamation shall be applicable;

3/ "breeder" means: a person who has discovered a new plant variety through breeding or developed the newly discovered variety; b) a company that has employed or commissioned a person who has bred or discovered and developed a new plant variety; or c) a successor in title of the person specified in paragraphs (a) and (b) of this sub-article;

4/ "consignment" means a quantity of plants and plant products covered and being moved from one country to another by a single phytosanitary certificate;

5/ "container" means a bag, bottle, sack, box, barrel, case, tin, receptacle wrapper or other materials in which the seed is placed or packed;

6/ "distinctness, uniformity and stability testing" means an evaluation of whether a candidate variety meets the distinctness, uniformity and stability criteria set for the particular species of crop;

7/ "field inspection" means an official inspection of a seed field to check compliance with field standards set by Ethiopia Standard Agency;

8/ "field standards" includes requirements for isolation distance from other variety/off-types, crop rotation, disease, shedding pollen and weeds when growing crop as part of the seed certification programme;

9/ "off-type" means a plant which doesn't display the recognized characters of growth, morphological formation either in loaf or flower, a shape or color or height is in any way obviously different from accepted;

l0/ "isolation distance" means the minimum required distance between two crop fields of the same species or closely related species to prevent contamination, either technically or genetically;

11/ "label" means any written or pictorial statement affixed to a container of seed to identify the seed;

12/ "national performance trial" means growing of newly developed varieties to assess value for cultivation and use characteristics against the local or standard variety;

13/ "National Performance Trial Evaluation Technical Committee" means a national committee established to perform technical evaluations and give recommendations on applications to release a new variety;

14/ "National Variety Register" means a national variety register to record released varieties;

15/ "National Variety Release Committee" means a committee established to recommend on release of varieties, to the Ministry for final decision, based on the reports of the National Performance Trial Evaluation Technical Committee;

16/ "permanent designation" means name given to a newly-released variety for entry into the National Variety Register;

17/ "sealed" means with respect to a seed package, fastened in such a manner that it is impossible to open the seed package without leaving evidence of its having been opened;

18/ "seed certification" means a quality assurance system whereby seed intended for marketing is subject to official control and inspection;

19/ "seed lot" means a specified quantity of seed, which is homogeneous and physically identifiable.

PART TWO - VARIETY RELEASE AND REGISTRATION

3. Criteria for Release

1/ The distinctness, uniformity and stability and value for cultivation and use characteristics of the candidate varieties shall be evaluated before their release.

2/ The distinctness, uniformity and stability evaluation of the variety shall fulfill the following characteristics: a) clearly distinguishable from all the other existing varieties in one or more characteristics; b) uniform in its characteristics; and c) stable in repeated multiplication cycles.

3/ The value for cultivation and use characteristics evaluation of the variety shall show their following characteristics: a) superior to existing varieties in one or more characteristics such as amount of yield, resistance to disease, maturity and other similar characters; b) highly desirable by users.

4. Application for Variety Release

1/ Any person who applies to release a variety shall submit his application to the Ministry for distinctness, uniformity and stability and national performance trial test.

2/ The Ministry shall issue detail directive for the implementation of sub-article (l) of this Article.

5. Variety Trial

The Ministry shall perform both National performance trial and distinctness, uniformity and stability test and generate and provide the report to National Performance Trial Evaluation Technical Committee for evaluation.

6. Evaluation for Release of Variety

1/ The National Performance Trial Evaluation Technical Committee shall evaluate the candidate variety for release against the criteria provided for under Article 3 of this Regulation through data analysis and national performance trial evaluation.

2/ The Ministry shall issue detail directive for the implementation of sub-article (l) of this Article.

7. Recommendation of the National Variety Release Committee

1/ The National Variety Release Committee shall, based on the National Performance Trial Evaluation Technical Committee report, propose a recommendation for the final decision of the Ministry.

2/ The recommendation submitted to the Ministry pursuant to sub-article (l) of this Article may propose: a) full release of the variety; b) provisional release of the variety; c) a further test of the variety; or d) rejection of the variety.

8. Permanent designation

1/ A permanent designation to be assigned to a new variety by the breeder shall: a) be short and precise; b) allow the variety to be identified; but not consist only of numeric figures; c) not to mislead or confuse the identity of the variety with other varieties; d) not to have similarities with the name of other varieties registered in the National Variety Registry and e) not affect rights previously granted in Ethiopia or any other country.

2/ Failure to conform to the criteria set forth under sub-article (1) of this Article shall be ground for rejection of the designation.

3/ A person who already registered a variety designation may change designation by applying to the Ministry with justification and upon payment of fee prescribed in the Rate of Fees for Seed Competency and Related Services Council of Ministers Regulation, if the Ministry approves.

9. Registration

When a variety has been approved for release, the Ministry shall enter the following information in the National Variety Register:

1/ crop name, variety name, registration number, registration date, year of release, distinguishing distinctness, uniformity and stability trait and pedigree of the variety where applicable;

2/ where relevant, conditions of release such as restricted, specific or wider adaptation;

3/ additional data such as yield potential, adaptation, quality, disease and pest reaction; and

4/ name of person registering the variety or maintainer of the variety.

10. National Variety Register

The Ministry shall:

1/ organize and keep the National Variety Register;

2/ regularly register in the National Variety Register the newly released varieties;

3/ remove the obsolete varieties from the National Variety Register;

4/ annually publish the variety register and make accessible to stakeholders.

11. Cancellation of Registration

1/ The Ministry may cancel the registration of any variety: a) if the variety losses the characteristics upon which its release was based or those characteristics have been significantly changed or degraded; or b) if it is found to pose a risk to human or animal health and safety to the environment; c) if the variety has been found to be indistinguishable from a variety that was already registered under a different name; d) if the variety was released or registered on the basis of false, misleading or incorrect information submitted.

2/ Prior to cancelling the variety registration pursuant to this Article, the Ministry shall notify in writing to the person who registered the variety and give him the opportunity to be heard within 15 working days.

12. Service Fee

1/ The service fee to be paid for variety release and registration shall be those prescribed in regulation / issued pursuant to Article 27 (1) of the Proclamation.

2/ The fee for any service shall be paid at the time when the application for a service is made.

13. Administration of Variety Release and Registration Process

To administer the national variety release and registration process, the Ministry shall perform the following activities:

1/ receive and process applications for release of new varieties;

2/ conclude contract for national variety trial sites on appropriate agro-ecology and perform trials;

3/ perform both distinctness, uniformity and stability and national performance trial for a minimum of two seasons in at least three sites having similar agro-ecology;

4/ perform both value for cultivation and use and distinctness, uniformity and stability test for at least one season in related agro-ecological zone, for importation of a variety that has already been released outside of the Ethiopia;

5/ arrange and provide logistical support to National Performance Trial Evaluation Technical Committees;

6/ receive, analyze and compile the National Performance Trial Evaluation Technical Committee reports as well as receive results of distinctness, uniformity and stability and organize National Variety Release Committee meetings and minute its deliberations;

7/ enter approved varieties in the National Variety Register in accordance with Article 10 of this Regulation;

8/ ensure that the required quantity of seed of each newly-released variety from public research and any private sector which develop variety from public genetic resources is submitted to the Institute of Biodiversity Conservation for long time storage;

9/ follow up the quality of breeder seed production and varietal maintenance services for officially released crop varieties;

10/ ensure that the National Variety Register is reviewed on a regular basis;

11/ periodically, assess the National Variety Release Committee activities and recommend strategies to improve its effectiveness.

PART THREE – SEED PRODUCTIO AND DISTRIBUTION

14. Obligations of Producers

Any producer of released variety seed shall have the following obligations:

1/ hold a valid certificate of competence issued pursuant to Article 6 (1) of the Proclamation;

2/ undertake production in accordance with the quality standard set for seed certification;

3/ participate in integrated production planning activities; and

4/ comply with the requirement specified in the directive issued by the Ministry to improve the quality or quantity of seed production.

15. Registry of Seed Producers and Distributors

The registry maintained by the Ministry pursuant to Article 9 of the Proclamation with respect to released variety of seed producers and distributers shall be updated regularly and shall contain at least the following information:

1/ name and address of the seed producer and distributer;

2/ species, variety, class of seed, and hectare of land if producer;

3/ status of certificate of competence;

4/ year of production of the seed.

16. Seed Production Planning and Database

1/ The Ministry and regional authorities together with public and private stakeholders shall develop a strategy to enable production and distribution of registered seed varieties as provided under Article 7 of the Proclamation.

2/ The seed production database to be maintained by the Ministry pursuant to Article 7 of the Proclamation shall contain the following information: a) annual production targets and allocation of responsibilities; b) annual production statistics for each type of seed by organization and in general; c) land, input, infrastructure and other resources required to produce the seed; and d) any other information relevant to national seed production.

3/ The seed production database shall be prepared in electronic format and be linked to the registry of released variety of seed producers and distributors referred to in Article 15 of this Regulation.

17. Seed distribution

The distribution of seed shall be carried out in accordance with the detail implementation directive to be issued by the Ministry.

PART FOUR - SEED QUALITY CONTROL AND ASSURANCE

18. Responsibilities for Seed Quality Control and Assurance

1/ The regional authorities shall have the responsibility for quality control and certification of regionally produced pre-basic, basic and certified seed to be released on the domestic market as “Approved Seed" or "Quality Declared Seed".

2/ The Ministry shall be responsible for the quality control and certification of: a) imported registered seed for release on the domestic market as Approved Seed; b) domestically produced seed for export and c) emergency seed.

3/ The quality control of seeds shall be undertaken in conformity with Ethiopian seed standards.

19. Eligibility for Certificate of Seed Quality

ln order to be eligible for certificate of seed quality, the seed shall be:

1/ of a registered variety;

2/ produced by a producer who holds valid certificate of competence; and

3/ obtained from known source.

20. Application to Obtain Certificate of Approved Seed or Quality Declared Seed

Application to obtain certificate of approved seed or quality declared seed shall be submitted by accompanying the following:

1/ document of application filled on the forms prepared by regional authority;

2/ receipt of payment of inspection fees; and

3/ seed from one official tag taken from each lot of seed planted.

21. Issuance of Certificate of Approved Seed

When application by a concerned person is lodged, the issuance of certificate of approved seed shall undergo the following steps:

1/ field inspection of the seed;

2/ seed processing and sampling;

3/ testing in accredited laboratory;

4/ affixing of tag and seal on packaging or containers;

5/ preparation of report.

22. Issuance of Certificate of Quality Declared Seed

1/ The producer shall, to obtain certificate of quality declared seed, undertake the following steps through its internal quality control system: a) verify that the field standards are maintained during production; b) maintain information related to the source of seed; c) seed processing and parking; d) seed sampling and analysis of quality test in order to verify conformity to the prescribed standards; e) affixing of tag and seal on packaging or containers; f) prepare final report.

2/ The producer shall apply to the appropriate regional authority for issuance of a certificate of quality declared seed based on the report prepared pursuant to paragraph (f) of sub-article (1) of this Article.

3/ The appropriate regional authority shall issue certificate of quality declared seed to producer upon fulfillment of the information specified under sub-article (1) of this Article.

23. Field Inspection

1/ The Ministry shall, in collaborate with Ethiopian Standard Agency, develop minimum field inspection standards which include the following: a) standard of seed planted; b) crop rotation; c) isolation distance; d) maximum percentage of other varieties or off-types; e) maximum percentage of seed borne disease; f) maximum percentage of objectionable weed plants; and g) minimum number of inspections required.

2/ The steps for field inspection shall, including analysis and reporting of results, be carried out in accordance with working guidelines issued by the Ministry.

3/ Where a producer disagrees with the results of any inspection, he may appeal to the regional authority within five working days for re-inspection subject to the payment of another inspection fee. If a field standard is approved after a re-inspection, the service fee paid for re-inspection shall be returned.

24. Seed Processing

1/ Seeds that have passed field inspection shall be processed before being sent to laboratory testing.

2/ A seed processor who maintains certificate of competence and registered shall process seed that has passed field inspection.

25. Seed Lots

1/ Seed lots shall be constituted from harvested seed of a single species in accordance with maximum size requirements provided for in the International Seed Testing Association requirements.

2/ Each seed lot shall be assigned a unique identifying lot number following the internationally recognized code scheme. The code shall also include letters or numbers to identify the federal or regional authority and the year of production.

26. Seed sampling

1/ The professionals authorized by the Ministry or regional authority shall draw samples.

2/ Seed sampling from seed lots shall be taken in accordance with the rules of International Seed Testing Association.

3/ The sample seed from all processed lot shall be collected free of charge for purposes of laboratory testing and post control planting and examination.

4/ Any sample taken for laboratory analysis shall hold appropriate reference number.

5/ The seed lots arranged for sampling shall not exceed the maximum weights set in the rules of the International Seed Testing Association.

6/ Seed producers and distributers shall maintain calibrated scales for conforming the weight of a seed lot.

7/ The seed producer shall pay service fees prescribed by Government for sampling service.

27. Packaging and labeling of samples

1/ Samples shall be packed in moisture-proof containers that are fastened and sealed at the time of sampling in such a way that renders visible any attempt to alter or change the sample.

2/ The description of label to be affixed on a container of samples shall be specified in the directive to be issued by the Ministry.

3/ The amount of temperature and humidity, duration of time and other conditions necessary for storage of samples shall be prescribed in the directive to be issued by the Ministry.

28. Laboratory Testing

1/ A seed that has passed field inspection pursuant to Article 23 of this Regulation shall be subject to laboratory testing in accordance with International Seed Testing Association rules.

2/ The laboratory's competence of seed testing shall regularly be supervised by the Ministry or regional authority.

29. Sample Seed Testing

1/ The purity, germination, moisture, health and other relevant test for sample seeds shall, in accordance with International Seed Testing Association rules, be conducted within two to three days of receipt of the sample.

2/ The sample test results shall be recorded and reported within 7 to 21 days after testing.

30. Certificate of Seed Quality

1/ The owner of a seed granted with a certificate of seed quality by regional authority upon meeting the requirement specified under Article 13 (1) of the Proclamation shall attach the following certification tag to each seed lot of certified seed or quality declared seed: a) name and address of the organization; b) certificate number; c) crop type and variety name; d) seed class; e) reference number; f) net weight of seed; g) year of production; h) date of sealing; i) expiry date; and j) warning text if treated with drug.

2/ The validity period of certificate of quality shall be determined by directive to be issued by the Ministry.

3/ The validity period of any certificate of quality may be extended upon re-testing, if the seed lot is found to conform to the prescribed standards for physical purity, germination and health.

31. Packaging and Labeling of Approved Seeds

1/ Approved seed shall be packaged and labeled in accordance with the requirements set by the Ethiopian Standard Agency and international standards.

2/ Seed lot shall not be packaged and distributed before the regional authority seed tester has released a test result certificate.

3/ No person shall, except the ultimate user, remove labels, seals or open mechanically sewn or closed packets of seed.

4/ Quality approved seed shall only be re- packaged by the decision of the regional authority or the Ministry under their supervision and the re-packaged seed shall be similar with that of the original one.

5/ Seed to be supplied for market shall have a label affixed or glued on the package with the information specified under 30 (1) of this Regulation which cannot be removed easily under normal use.

6/ The label to be affixed or glued pursuant to sub-article (5) of this Article shall be rectangular in shape with different colors for different classes of seeds in the following scheme: a) for a breeder seed or pre-basic seed white color with diagonal violet stripe; b) basic seed with white color; c) first generation certified seed with blue color; d) second or successive generation of certified seed with red color; e) for all classes of seeds one end of the label from other label shall be colored blacked for a minimum distance of 3cm; f) for all classes of seeds one end of the label shall be overprinted black for a minimum distance of 3 cm leaving the rest of the label colored.

32. Post Control Testing

1/ Post control testing on seed lots that obtained certificate of seed quality shall be conducted in accordance with international standards by taking samples.

2/ Plot under which post control testing is conducted shall be open for examination and assessment of all parties interested in the seed industry.

3/ The regional authority shall, after post control, write a report on the contamination and other deviations observed in the trial plots, as well as identify the sources of the problem and take possible measures to eradicate such deviations in subsequent seasons.

33. Non Conforming Seed

Where a seed lot is downgraded or rejected for certification in accordance with Article 16 (1) of the Proclamation, the regional authority shall notify the applicant in writing about:

1/ the reasons for its decision;

2/ his right to institute action in the court of law; and

3/ his right to use the rejected seed in any other form other than seed purpose as provided for under Article 16 (2) of the Proclamation.

PART FIVE – EXPORT AND IMPORT OF SEED

34. Requirements to be Met by Seed Importer

Any person who engages in seed import business shall:

1/ have a valid seed importer certificate of competence;

2/ obtain import permit from the Ministry;

3/ meet the requirements set under Article 35 of this Regulation;

4/ accompany phytosanitary certificate with the consignment;

5/ produce invoice and receipt document containing the species and variety name and the country of origin of seed; and

6/ ensure that the consignment meets all packaging and labeling requirements.

35. Requirements for Seed to be lmported

1/ Without prejudice to Article 17 of the Proclamation, seed may be imported when it meets: a) the Ethiopian seed standards set by the Ethiopian Standard Agency in cooperation with the Ministry; b) any other requirement set by the directive of the Ministry.

2/ Notwithstanding the provision of sub-article (l) of this Article, the Ministry may waive the requirements for small amounts of seed imported for private compound aesthetic purpose.

36. Application to Obtain Seed Import Permit

1/ An application to obtain seed import permit from the Ministry shall be submitted by accompanying with the following information: a) statement showing the name and address of importer, country of origin of seed and consignment's final destination; b) relevant documents specified under Article 34 and Article 35 (1) of this Regulation; c) statement showing species, variety and quantity of seed; d) statement on the type of means of transport and port of entry; e) other information specified in the directive of the Ministry.

2/ The import permit issued in accordance with this Regulation shall be valid for six months.

37. Entry Point Inspection

The seed inspector assigned by the Ministry shall conduct entry point inspection on the seed to be imported to ensure its compliance with the requirements provided for under Article 23 (2) of the Proclamation, Article 34 and Article 35 (1) of this Regulation.

38. Substandard Seed lmported

1/ The seed imported without meeting the Ethiopian Seed Standard, as the case may be: a) returned to the country of origin by the expense of importer; b) put to industrial use; or c) destroyed by the expense of importer being under supervision.

2/ The Ministry may issue directive necessary on the other options of disposal of sub-standard seeds and for the implementation sub-article (1) of this Article.

39. Requirements to be met by Seed Exporter

Any person who engages in seed export business shall:

1/ have a valid seed exporter certificate of competence;

2/ obtain seed export permit from the Ministry;

3/ meet the minimum quality standards of the importing country;

4/ obtain phytosanitary certificate for the seed;

5/ obtain permit from Ethiopian Institute of Biodiversity; and

6/ meet other requirement specified in the directive issued by the Ministry

40. Application to Obtain Export Permit Certificate of Competence

Application submitted to obtain seed export permit certificate from the Ministry shall be accompanied with the following information:

1/ statement showing the name and address of exporter and importer and consignment's final destination;

2/ relevant documents specified under Article 39 of this Regulation;

3/ statement showing the species, variety and quantity of seed;

4/ statement showing the type of means of transport;

5/ other information specified in the directive of the Ministry.

PART SIX – CERTIFICATE OF COMPETENCE

41. Requirement of Certificate of Competence

Any producer, processor, wholesaler, distributer or retailer of seed shall obtain a certificate of competence from the Ministry or from the regional authority in accordance with Article 19 of the Proclamation.

42. Criteria for a Certificate of Competence

1/ Any person submitting application pursuant to Article 41 of this Regulation to obtain seed producer certificate of competence shall have: a) a suitable and accessible farm land for seed inspection; and b) sufficient professional with basic knowledge and experience in seed production.

2/ Any person submitting application pursuant to Article 41 of this Regulation to obtain seed processors certificate of competence shall have: a) suitable warehouse facilities for seed storage; b) requisite machinery and manpower to perform the processing activities; and c) a professional with basic knowledge and experience in seed processing.

3/ Any person submitting application pursuant to Article 41 of this Regulation to obtain seed importer, exporter and distributor certificate of Competence shall have: a) his own or rented suitable warehouse facilities for seed storage; and b) a professional with basic knowledge and experience in seed handling.

4/ Without prejudice to sub-articles (1), (2) and (3) of this Article, the Ministry may issue directive on the detail criteria and implementation procedures.

43. Submission of Applications

Any application submitted pursuant to Article 41 of this Regulation to obtain a certificate of competences shall be accompanied with the following information:

1/ the applicants full name and address;

2/ detail information on the compliance of requirements specified under Article 42 of this Regulation, as the case may be;

3/ other information specified in the directive of the Ministry.

44. Issuance of Certificate of Competence

1/ A certificate of competence may be issued by the Ministry or by the regional authority when the requirements provided for in this Part are complied with and upon payment of service fee.

2/ A certificate of competence may not be transferred or assigned in any form to a third Party.

3/ The validity period of certificate of competency and its renewal shall be prescribed in directive to be issued by the Ministry.

PART SEVEN – MISCELLANEOUS PROVISIONS

45. Seed Inspection

1/ The Ministry shall: a) issue directive to determine the minimum qualification and experience needed for the assignment of seed inspectors; and provide training to develop their capacity; b) prepare standard operational guidelines and directive for the seed inspectors to carry out their functions.

2/ Without prejudice to the responsibilities provided for under Article 23 (2) of the Proclamation a seed inspector shall have responsibilities to: a) conduct field inspection on seed and inspect whether it meets the Ethiopian standard prescribed by Ethiopian Standards Agency; b) conduct at least three field inspections on hybrid crop and at least two field inspections on other crops; c) prepare a report for each field on which inspection is conducted; d) ensure seed passed field inspection by putting mark with indelible ink on the container before it is transported to the processing place; and e) conduct quality control inspection of the registered seed producer's field, seed processing and storage warehouse for the purpose of certification.

45. Inapplicable Regulations

No regulation shall, in so far as it is in consistent with this Regulation, have effect in respect of matters provided for in this Regulation.

46. Effective Date

This Regulation shall enter into force on the date of publication in the Federal Negarit Gazette.

Done at Addis Ababa, this 18th day of February, 2016.

HAILEMARIAM DESSALEGN

PRIME MINISTER OF THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

ANNEX 5. Questionnaire

Data Collection Guide
for a Cotton Seed Sector Study in ETHIOPIA

Table of contents

1. Framework Conditions

1.1. Description of cotton production

1.1.1 Main production areas, cotton statistics, number of cotton farmers, main cotton stakeholders, and basic production details (desk study with main contribution from the research counterpart)

Currently Ethiopia is producing 40-50,000 t of fiber from about 55,000 ha (ETIDI, 2018) in 7 regions (Tigray, Amhara, Afar, Benishangul Gumuz, Gambela, Somali and SNNPRS). Ethiopian cotton sector is very diverse. Large and medium scale producers in irrigated and rainfed areas cover 70 % production, while small scale producers, mainly in rain fed areas, share the remaining 30 %. Production systems involve rainfed (74 %) and irrigation (26 %). Row planting is practiced in irrigated plantations and broadcasting is predominant in rain fed production. Large scale and medium scale use tractor drawn equipment for ploughing and planting, whereas the majority of small scale farmers use oxen drawn tools.

The Ethiopian cotton has several market opportunities of uneven importance: the small scale local weavers require very clean cotton, spinned manually, the domestic textile mills and the export of lint.

The National Cotton Development Strategy (NCDS, 2017) plans to increase the national production to 1 million ha in 2030.

1.2. Specific Legal Provisions regarding cotton

1.2.1 Brief description of the main legal provisions on cotton germplasm:
a) Cotton germplasm collection and conservation
b) GMO cotton
c) Cotton variety registration, evaluation, release, protection, national listing, licensing and royalty collection

a) Werer Agricultural Research Center (WARC) located in the Awash valley (Afar) has the mandate to maintain and expand a cotton germplasm collection
b) GMO cotton has been authorized for confined experiment, subject its importation and release is subject to a permit delivered by the Ministry of Environment and Forest (MoEF)
c) see report and in particular the paragraph on Legal documents

1.2.2 Brief description of the main legal provisions on cottonseed multiplication/certification:
a) Who may multiply cottonseed?
b) Cottonseed certification (OECD, US, national system)
c) Quality declared cottonseed
d) Farmers' privilege
State the legal documents where these provisions are stipulated.

a) Cotton seed multiplication in Ethiopia needs license from Plant and animal health department under Ministry of Agriculture and regional counterparts. To obtain a certificate of competence, the applicant have to demonstrate their ability to establish an internal quality control process. Quality standards have been set by the MoA and the Ethiopian Standard Agency.
b) Currently, large scale farms, farmer unions, ginnery owners with outgrower scheme or any licensed business with outgrower-scheme can be authorized to produce seed. According to ETIDI and Plant health directorate, seed certification is basically non-existent as formal seed sector is just taking off from nowhere and the work of the institutes has been encourage seed producers as much as possible.
c) only "Quality Declared Seed" are produced (see Seed Regulation No. 375/2016)
d) see Breeder's Right No. 481/2006

There is national seed proclamation and regulation for the production of crop seeds as can be seen in the report and in particular the paragraph on Legal documents (Seed Proclamation No.82/2013, Seed Reregulation No. 375/2016, Breeders' Right No. 481/2006 and Biosafety Amendment No. 896/2015).

1.2.3 Brief description of the main legal provisions on seed processing:
a) Cottonseed processing (cleaning, drying, grading, treating, packaging, labelling)
b) Cottonseed storage
c) Quality control (for certified and quality declared cottonseed)
State the legal documents where these provisions are stipulated.

Ethiopian Seed Proclamation No.82/2013, seed regulation No. 375/2016 and Ethiopian cotton seed standard ES441:2000 require and dictate some provisions on quality control, inspection and certification. However, there are no legal provisions on cotton seed processing and storage.

1.2.4 Brief description of the main legal provisions on cottonseed marketing:
a) Who may market, distribute cottonseed, legal conditions and requirements
b) Cottonseed import regulations
State the legal documents where these provisions are stipulated.

According to Ethiopian Seed Proclamation No.82/2013 article 8 seed should be marketed by any person with certificate of competence from Ministry of Agriculture. Under article 17 9, sub-article 1 and 2) any seed import and export should be approved and by Ministry of Agriculture subject to prior variety trial and adaptation as established by the national variety release committee and shall be listed in the National Variety Register in accordance with Proclamation No. 82/2013.

1.2.5 Do farmers have a choice of the cotton variety they sow?
If yes, do legal texts secure the right of choice of cottonseeds for farmers? If no, what does the legal text say?

According to Proclamation No.82/2013 article 16 (sub article 1 & 2) any person whose seed could not conform for quality control to be distributed it could be utilized for own replanting. And according to information obtained from MOA (and Breeders' Right) there is no provision that bare farmers to use their own seed or local source. This is partly due to the capacity of national seed system to provide certified seed. Moreover, such shortcomings are critical for cotton seed supply where inspection and quality control are never realized.

1.2.6 Do legal texts protect specifically disadvantaged groups such as remote smallholder farmers, females, and young farmers?

The Breeders' Right act allows the farmers' communities and the farmers to use, multiply and sell even licensed seed, but not to sell for industrial or large scale users

1.3. National Development Plan

1.3.1 Is cottonseed specifically addressed in the document (yes/no)? Provide full document name and publication date. What are the major objectives mentioned (example: improved qualities, access, information...)?

In GTP II document cotton sector along with textile has given due emphasis and expected 1 billion USD from export of textile and apparel product (GTP II 2015-2020). National Cotton Development Strategy (SOFRECO, 2017 (PP66)) provides information on the legal requirement of productivity, GOT, longer staple length and strength, certification and marketing of seed while EIAR cotton research strategy (2016-2030) provides the type, yield and quality requirements of cotton seed in the short run, medium and long run respectively.

1.4. Agricultural Development Strategy and Plan

1.4.1 Is cottonseed specifically addressed in the document (yes/no)? Provide full document name and publication date. What are the major statements regarding plant breeding, seed multiplication, seed processing and storage, seed market and distribution, seed quality control)?

In GTP II document (2015-2020) cotton has been considered as a strategic crop and proposed detailed strategic plan would developed by designated agency for which ETIDI has developed National Cotton Development Strategy (2018-2032) (SOFRECO, 2017).

1.5. Environmental and Biodiversity Policy

1.5.1 Is biodiversity a national objective related to the cottonseed sector mentioned in any relevant document? Provide full document name and publication date.

Biodiversity is mentioned in the NCDS (2017) as a component of sustainable cotton sector development and natural resource management, under strategic objective 3 (pp.92-96)

1.6. Market Interventions Affecting the Seed Market

1.6.1 Which tariff and non-tariff barriers are in place related to the seed market for cotton?

Although there are no tariff barriers as cotton and any other seed are tax free, very lenient regulation of cotton seed marketing highly affected cotton seed supply. Any type of seed can be available in the market currently (fuzzy/delinted/dressed, improved/ recycled/from the ginnery/brokers/traders) etc, which affects quality of production and development of formal seed system and interest for certification.

1.6.2 Which taxes apply to cottonseed production, processing and trade? Are there any tax incentives or privileges in place?

Seed production is tax free so far to incentivize farmers and farms producing seed. Ethiopian government has a policy of tax exemption for seeds of any crops and recently it applied to 600 farm inputs, equipment and machineries including seed processing and post-harvest handling.

1.6.3 Which subsidies are in place affecting production, imports, distribution, transport, local market prices of cotton, including seed aid?

None

1.6.4 Are there any other macro-economic interventions in force relevant to the seed market like e.g. foreign exchange control?

None?

1.6.5 What are the main challenges regarding the legal and policy framework for cotton?

1) Despite the development of NCDS and research strategies and huge focus on textile sub sector there is no clear policy on cotton sector development and cotton seed sector development.
2) Institutional capacity to implement and enforce NCDS and research strategy objectives activities
3) Cotton research, extension, and input supply chains are under MOA while national cotton coordination is under ministry of industry where conflict of interest, confusion and mandate related the issue are not uncommon.

1.7. Major Constraints

1.7.1 Related to areas above, identification of key constraints facing the cottonseed system. Analysis of underlying reasons for constraints, incl. legal framework (be specific), government policies, natural resource endowment, technical know-how etc.

- Lack of incentive to seed producers
- Lack of enforcement in seed system (free operation of informal seed supply chain)
- Market fluctuation of cotton (discourage cotton production)
- Shortage of efficient seed dressing chemical
- High consumption of acid in the present seed processing system, with possible related environmental impact.

2. Plant Breeding

2.1. Germplasm Collection and Conservation

2.1.1 What are the cotton germplasm sources for plant breeder? Where are suppliers located?

Germplasm source for breeders are predominantly sporadic collection across seed growing regions of Ethiopia. Moreover, small amount of germplasm could be obtained while adaptation trial of imported seed for variety registration by private seed suppliers.

2.1.2 Do gene banks for cotton exist in [country]? What are their objectives?

There is gene bank in the country (Ethiopian biodiversity institute), but the collaboration and partnership with the research environment has not been well nurtured. However, breeders maintain germplasms by planting every two years to ensure viability of available germplasms.

2.1.3 What is the present cotton varietal national situation ("variety catalogue") – variety/ies name, - origin (local/imported), - areas and stages (under commercial cultivation, under advanced seed increase stage)"

Werer Agricultural Research Center (WARC) released 37 varieties as of 2019. The majority of released varieties are open pollinated varieties for irrigated production. The released varieties include open and Hybrid varieties imported and registered by private seed companies. However, Deltapine 90 and Acala SJ2 has been the most popular and commercial cultivation for the last 3 decades. Recently WARC has promoted Weyto 7 and Werer 50 varieties while Claudia variety released in 2014 has been getting attraction in irrigated and rainfed areas, popularised by a Non-Governmental Organization (Solidaridad Ethiopia).

2.1.4 How did the diversity of the cotton varieties develop in the last 10 years? How will it presumably develop in the future?

Most of research effort on variety development has been in irrigated environment while rainfed areas were largely unaddressed. However, variety development efforts have been accelerated in the last 10 years where more than 10 varieties developed for irrigated production. The prospects of the coming years look bright as young and energetic breeders are in the position although there is scarcity of experienced breeders.

2.1.5 What are the main challenges regarding cotton germplasm collection and conservation?

- ✓ lack of partnership with international stakeholders to source germplasm
- ✓ lack of resources (vehicle, fund, plots and personnel to collect and conserve germplasm in regular bases
- ✓ Poor collaboration with Biodiversity Institute

2.2. Plant breeding objectives and activities for cotton

2.2.1 Is plant breeding for cotton dominated by public, private or civil society organizations? Who is involved? Role of cotton companies etc.

EIAR, public research is mandated to breed and maintain purity of variety. However, licensed private companies can import and register varieties as well articulated by seed proclamation and regulation.

2.2.2 What are the cotton breeding objectives?(differentiate public / private)

Previously the objective of cotton breeding was productivity. However, recently the objective has been to improve productivity, quality, and pest resistance/tolerance. Suitability for mechanization is going to be another objective in the future.

2.2.3 Is any cotton breeding done using GMO techniques (or other techniques)?

GMO law have been approved in 2015 and two hybrid varieties were registered in 2018 by JK seed of India after two year adaptation trial. Currently the two varieties are under commercial production in limited areas in Gambela Region by commercial farmers.

2.2.4 According to which criteria do breeders decide to breed and to maintain a certain cotton variety? Do they get information on variety characteristics demanded by farmers, agro-processors, consumers, exporters? How and by whom? Are farmers involved (participatory breeding)? (differentiate public, private)

Breeding ideas are collected during annual stakeholder gathering and survey of agro-processors and customer demand. During the annual stakeholder meeting, farms, designated government offices and cotton producers association present breeding ideas. Moreover, farms host National variety trial, adaptation trial and verification trial at which they involve in data collection and performance evaluation of potential varieties.

2.2.5 Which other stakeholders are involved in the decision, which cotton varieties to breed and to maintain besides the breeders?

At EIAR there are two departments involved in the decision, together with the Cotton research: the Technology Multiplication department and the Technology extension, dissemination and promotion department.

ETIDI cotton development wing is also involved somehow on which varieties to be maintained, and promoted multiplied. As ETIDI is coordinating the cotton development and textile production promote varieties popular with the farmers, productive, good GOT and acceptable in the spinning mill. They lobby EIAR to do the maintenance and multiplication of preferred varieties.

2.2.6 What are the cotton germplasm sources for plant breeder? Where are suppliers located?

The major source of germplasm is collection from different cotton growing regions and older varieties (varieties released by WARC during the years which were shelved). Germplasms obtained during adaptation trial of imported varieties are also used in limited cases as most variety registration by imported seed suppliers have been hybrid.

2.2.7 What are the main challenges / constraints regarding cotton plant breeding?

- Lack of germplasm (especially long staples)
- Lack of equipment for quality measurement and no cold storage for germplasm
- Lack of resources (fund, vehicles, plot of land, experienced researchers)
- Technology (depend on convectional breeding only)
- Lack of international partnership
- Lack of interest by regional research centres (rain fed)

2.2.8 If breeders are involved in the multiplication scheme, at which stages: conservation and multiplication of breeder seeds, visit of the multiplication fields, elimination of off-types plants in the multiplication fields, ginning of seed cotton in the multiplication fields, support for the ginning of seed cotton in the multiplication fields by public or private cotton companies, etc?

Cotton breeders are heavily involved in the multiplication and maintenance (rogging off-types) of breeder's seed. They are only involved in the supervision of pre-basic seed multiplication and maintenance, which are fully managed by the Technology multiplication department.

2.3. Partnerships and linkages

2.3.1 Is there any (formalised?) collaboration between national research centres, CGIAR centres, other research institutes, sub-regional research organisations, universities, private breeders, donor projects, other VC actors, incl. farmer participation, cotton companies or other stakeholders?

No

2.3.2 What is the nature of such collaborations?

No

2.3.3 What are the main challenges regarding partnerships and linkages?

No

2.4. Major Constraints

2.4.1 Related to areas above, identification of key constraints facing the cotton breeding system. Analysis of underlying reasons for constraints, incl. legal framework (be specific), government policies, natural resource endowment, technical know-how etc.

- Lack of germplasm (especially long staples)
- Lack of equipments for quality measurement and no cold storage for germplasm
- Lack of resources (fund, vehicles, plot of land, experienced researchers)
- Technology (depnd on convectional breeding only)
- Government pressure (interested only on adaptation trial or discourage crossing)
- Lack of international partnership
- Lack of interest by regional research centres (rain fed)

3. Seed Multiplication

3.1. Formal Seed Sector

3.1.1 Is there a national cottonseed multiplication scheme in place; if yes provide description

No

3.1.2 Is cottonseed multiplication dominated by public, private, cooperative or civil society organisations? Overview of the structure

- ✓ Private companies (commercial farms, ginneries, independent seed suppliers) are dominant
- ✓ Some share of public: Werer Research Center multiply basic and pre basic seed of selected varieties
- ✓ Recently limited Non-Governmental organizations involved (Solidaridad facilitated Claudia variety dissemination)
- ✓ Unions and cooperatives disseminate seed. But they buy from private seed companies or commercial farms initially to distribute to their members.

3.1.3 Is cottonseed multiplication dominated by a few large companies or rather diverse and decentralised? Overview of the structure.

- ✓ WARC multiply basic and pre basic seed of DP 90 and Weyto 7 varieties and distribute to any farms or farmers upon request. However their annual capacity has been close to 10 t only.
- ✓ Delinted seed supplied by commercial farm and licensed seed suppliers provide seeds for cotton producers in Afar region, Oromia and SNNPRS regions
- ✓ Delinted and chemical dressed licensed commercial farms (and licensed suppliers) who supply seeds to medium and large scale and small scale farmers in western part of cotton growing regions (Humera, Metema, Benishangul Gumuz, Gambela) where seedling pest called flea beetle is devastating to early seedling stage.
- ✓ Fuzzy supply (own seed, ginnery or other source). Small scale farmers at Humera area, Metema area, and SNNPRS (Arbaminch area) use fuzzy seeds from own source, bought from ginneries, local markets and fellow farmers. Still fuzzy such seed use dominates small scale production at Metema (Amhara region) and Arbaminch (SNNPR region).

3.1.4 Is there an established guide of good practices related to cottonseed production in place and used?

There are established standards (Ethiopian seed standard 441-2000) which are used by national and regional plant health and quarantine departments. However, most seed producers use their own rules as external inspection and control of seed production have not been developed

3.1.5 Are cotton out-grower schemes (subcontracted farmers) and contract arrangements a common practice?

There has been limited outgrower schemes in pocket areas arranged between independent seed suppliers and medium scale farms mostly in Gambela region. There are also such arrangements between farmers and Cooperative Unions at Metema and in the Humera area.

3.1.6 What are the conditions to work as a cottonseed producer?

According to Ethiopian Seed Proclamation No.82/2013 article 8 seed should be marketed by any person with certificate of competence from Ministry of Agriculture. Under article 17 9, sub-article 1 and 2) any seed import and export should be approved and by Ministry of Agriculture subject to prior

variety trial and adaptation as established by the national variety release committee and shall be listed in the National Variety Register in accordance with Proclamation No.82/2013. In addition, Business license required from national or regional government offices after competency issues according to regulation and proclamation completed/secured.

3.1.7 According to which criteria do formal cottonseed producers decide to multiply a certain variety?

The major reason for involving in formal seed supply is business case:

- ✓ Commercial farmers who have been supplying seed informally for decades have been recently required to have business license to supply seed otherwise it became illegal
- ✓ Multinationals, other independent seed suppliers (ginneries etc) who want to supply seed of any variety are required to register as seed supplier with competency certificate and business license

3.1.8 Where do formal seed producers obtain their cottonseed material from (e.g. nat., reg., int. breeder, import, farm saved, consumer markets)?

The source of formal seed supplier could be

- ✓ Own recycled seed (DP 90, Acala SJ2, Claudia, or any local): major source of seed supply
- ✓ Werer research Center (Mostly DP 90)
- ✓ Imported and registered seed through Multi nationals (GMO, Hybrid seeds)

3.1.9 What is the percentage of different types of cottonseed (certified, non-certified etc.) produced by the formal seed sector?

All seed are non-certified as inspection and quality control for seed cotton supply have not been well developed.

3.1.10 How and who do formal seed producers market to?

Formal seed producers sell seeds to large and medium scale farms, cooperative unions, farmers directly. Depending on the interest of farms and farmers they supply delinted or delinted and chemical dressed seed. Some independent seed suppliers arrange with outgrowers to provide seed and purchase them back, as multiplied seed, at the end of the season.

3.1.11 Is technical knowledge, market information (e.g. demand in terms of preferred varieties, qualities, quantities, package sizes, timeliness etc.) and any other support being provided to formal seed multipliers ? What, how and by whom?

ETIDI and WARC provide technical support and market information, variety selection and information and assistance on procedures of getting competence certificate and business license.

3.1.12 What are the main challenges regarding seed multiplication by the formal sector?

- ✓ Lack of alternative varieties
- ✓ Backward seed processing equipment
- ✓ Shortage of seed dressing chemical
- ✓ Volatility of demand (it depend on rain fall and cotton price)
- ✓ There is no external inspection and quality control
- ✓ Presence of informal seed supply system

3.2. Informal Seed Sector

3.2.1 Is there an informal seed sector in your country?
If no, skip to 3.3, If yes, who is predominantly involved in cottonseed multiplication (smallholder farmers, cooperatives, small commercial farmers, ginners)?

Yes.

Cooperatives, commercial farmers, ginners and traders (in local market) supply seed informally. Informal seed sector is by far the largest seed supply chain. Delinted and fuzzy seeds have been in circulation informally for decades and now.

3.2.2 According to which criteria do informal seed producers decide to multiply a certain variety?

Informal seed producers supply recycled seed upon request to any cotton growers based on the interest of producer (delinted or fuzzy). Traders of fuzzy or delinted seed can be seen in the local markets, selling mostly to small scale farmers. Cooperatives also buy from ginneries or any source and distribute to their member farmers and any in the vicinity upon request.

3.2.3 Where do informal cottonseed producers obtain their seed material from (e.g. breeder, farm saved, consumer markets)?

Informal cotton seed producers their seed from own farm, local market, ginners etc.

3.3. Major Constraints

3.3.1 Related to areas above, identification of key constraints facing the cottonseed multiplication system. Analysis of underlying reasons for constraints, incl. legal framework (be specific), government policies, natural resource endowment, technical know-how etc.

- ✓ Lack of basic seed supply of improved varieties
- ✓ Backward seed processing equipment
- ✓ Poor or no tagging, and marking with germination test (No well-developed certification at all)
- ✓ Shortage of seed dressing chemical
- ✓ Volatility of demand (it depend on rain fall and cotton price)
- ✓ There is no external inspection and quality control
- ✓ Presence of informal seed supply system/lenient control system by designated government offices
- ✓ Lack of well-developed contract farming for outgrower scheme etc

4. Seed-Cotton Processing, Seed Processing and Storage

4.1. Seed-Cotton Processing

4.1.1 Is seed-cotton processing and storage dominated by public, private, cooperative or civil society organisations? Overview of the structure.

- ✓ Seed and seed cotton processing are done by private farms/ginneries (100 %)
- ✓ WARC has annual seed processing capacity of 10 t seed

4.1.2 Is seed-cotton processing and storage dominated by a few large companies or rather divers and decentralised? Overview of the structure.

- ✓ So far, integrated large scale farms, private ginners and integrated textile mills dominate seed-cotton processing.
- ✓ There is only one small ginner around Arbaminch, which is ginning seed cotton for local weavers

4.1.3 Which seed-cotton processing steps (cleaning, drying, ginning, grading, treating, packaging, labelling), are commonly practiced, and differentiated by informal and formal sector?

- ✓ Steps for seed-cotton processing are (pre-cleaning-ginning-fuzzy seed)
- ✓ for seed processing the procedure is (10-12 kg fuzzy seed/1 litter acid delinting- separate sinker/floater-drying- chemical treatment)

4.1.4 How many ginning plants are operating and with what type of ginning do they operate (saw-gin or roller-gin)?

According to SOFRECO (2016), there were 21 ginneries thereof 17 functional. Four (04) ginneries are roller-type gins, 17 are saw-type gins. Since then, there have been at least 5 new installations around the country (which are functional).

4.1.5 Is technical knowledge, market information (e.g. demand in terms of preferred quality characteristics, package size and any other support being provided to cottonseed processors? What, how and by whom?

- ✓ ETIDI, EIAR provide training and other technical assistance to seed processors, facilitate dressing chemicals etc.

4.2. Seed Processing and Storage (addresses quality of seed)

4.2.1 Which storage technologies and practices are commonly used for various types of seed, differentiated by informal and formal sector?

- ✓ Both formal and informal seed suppliers use common warehouses (no cold room, no disinfection any other special treatment. No difference b/n formal and informal sector

4.2.2 What are the typical quality reasons for seed processing (differentiate between cleaning, drying, grading, treating, packaging, labelling) and storage?

- ✓ Main qualities for seed processing are a high percentage of fully filled seed, few rotten, with no damage due to strainers or ginning, not more than 8-10% humidity.
- ✓ Drying for long conservation,
- ✓ Grading for removing by floatation the broken aborted seeds,
- ✓ Treating to improve the resistance to pests and fungus, and improve the stand in the field
- ✓ Packaging to preserve the quality during storage and transport
- ✓ Labelling to inform the consumer about the product and guarantee some quality control

4.2.3 Whether the seeds are delinted, how and what proportion delinted / non delinted?

- ✓ In recent years most of large and medium scale and partly small scale use delinted seed.
- ✓ No present information available.

4.2.4 Whether the seeds are chemically treated with fungicides/insecticides, which molecules, and dosage?

- ✓ For the last decades the common seed treatment chemicals were Cruiser (Imidacloprid) (1 liter for 300 kg of seed) and Gaucho (Imidacloprid)(1 liter for 200 kg)

4.2.5 What are the main challenges regarding seed processing and storage?

- ✓ Backward seed processing equipment (acid with concrete mixer or, previously, mechanical delinting at Amibara Farm Entreprise in Awash area (it was the largest far with 15,000 ha cotton but switched to sugarcane in 2015)
- ✓ Environmental pollution and health hazard due to sulphuric acid use
- ✓ When the seed demand is not enough, few suppliers sell the extra to farmers the following year, with the risk of lower germination

4.3. Major Constraints

4.3.1 Related to areas above, identification of key constraints facing the cottonseed storage and processing system.

- ✓ Backward seed processing equipment (concrete mixer and acid use) and mechanical delinting with saw gins+ acid
- ✓ Environmental pollution and health hazard of sulphuric acid use
- ✓ Lack of demand result extra delinted seed remain for next season which lose germination but still supplied to farmers by some suppliers

5. Seed Marketing

5.1. Preliminary information on cotton seed marketing

5.1.1 Cottonseed price (per kg)? Recommended amount(s) of cottonseed (kg) per hectare? Actual average amount(s) of cottonseed (kg) sown per hectare? Which phytosanitary seed treatment(s) are applied?

Price of seed (2018)

- ✓ Delinted and dressed seed (60 ETB/kg
- ✓ Delinted only (5000 ETB/kg)
- ✓ Fuzzy seed (12 ETB/kg)
- ✓ GMO hybrid ($ 30/kg)
  - Recommended amount (kg/ha)vs actual
- ✓ Delinted: 15-20 kg/ha actual sown 10-15 kg/ha
- ✓ Fuzzy seed: 35-40 kg/ha actual sown 40-50 kg/ha
- ✓ GMO hybrid: 2.5 kg/ha

Seed treatment:

- ✓ Gaucho and Cruiser (Imidacloprid)

5.2. Seed Market (addresses access to demanded seed)

5.2.1 Is any financing / credit available for cottonseed buyers, particularly smallholder farmers? Details on financial institutions, loan conditions etc.

- ✓ Some farmers get credit or seed from their cooperative union. For example Dansha Union (Tigray), Metema Union (Amhara) and Shelemela farmers cooperatives(SNNPR) provide credit or seed on loan conditions for member farmers

5.2.2 What are the main challenges regarding seed supply?

- ✓ Presence of formal and informal system creates uncertainty for business case
- ✓ Suppliers might supply remaining delinted seeds from last year
- ✓ No mechanism to assure the supply of true to seed (not mixed)
- ✓ No seed certification and quality control
- ✓ Tracing seed source is impossible in some cases etc

5.2.3 Are there any specific difficulties faced by disadvantaged groups (women and youth) in accessing cottonseed?

No

5.2.4 What are the main distribution channels including the major stakeholders (from seed producer to final seed buyer), differentiated between informal and formal sector.

Formal seed supply

- ✓ Direct sell to producers
- ✓ Unions/cooperatives buy from supplier and distribute to member farmers

Informal seed supply:

- ✓ Use of own seed by farms (delinted) and farmers (fuzzy)
- ✓ Ginneries supply to unions/cooperatives then distributed to farmers
- ✓ Farmers by from local market as any commodity (delinted/fuzzy)

5.2.5 What are the main challenges regarding cottonseed distribution and access to cottonseed?

- ✓ Delinted/delinted and chemical treated seed by formal seed suppliers considered as expensive for small scale farmers
- ✓ Chemical treatment fail to protect seedlings from pest
- ✓ Some suppliers supply seeds with poor germination (from last season or wrong seed processing)
- ✓ Seed supply mostly delay due to varies reasons (formal seed supply)

5.3. Seed Market Information

5.3.1 Who provides information to market actors on new or better cotton varieties and their properties, sources of seed supply, market prices and technical know-how on proper seed handling? (e.g extension services, agro-vet dealers, seed producers, cooperatives etc.

- ✓ ETIDI,
- ✓ Agricultural extension offices
- ✓ Seed producers
- ✓ Civil society organizations
- ✓ ECPGEA etc

5.3.2 What are the main challenges regarding seed market information for producers and traders?

- ✓ Lack of well-developed coordination between ETIDI and regional extension offices
- ✓ No price setting for seed supply etc

5.4. Major Constraints

5.4.1 Related to areas above, identification of key constraints facing the cottonseed marketing system. Analysis of underlying reasons for constraints, incl. legal framework (be specific), government policies, natural resource endowment, technical know-how etc.

- ✓ Presence of formal and informal system creates uncertainty for business case
- ✓ Lack of well-developed coordination between ETIDI and regional extension offices
- ✓ No price setting for seed supply
- ✓ Scattered cotton production areas etc

6. Seed Use by Cotton farmers (non-seed producers)

6.1. Knowledge and Information on Seed

6.1.1 Who provides information to farmers on new or better cotton varieties and their properties, sources of seed supply, market prices, and technical know-how on proper seed handling and use? Organisations could include extension services, agro-vet dealers, seed producers, cooperatives etc.

- ✓ Regional Agricultural Extension offices
- ✓ Unions/Cooperatives

6.1.2 What kind of knowledge and information (new or better varieties and their properties, sources of seed supply, market prices, and technical know-how on proper seed handling and use etc) is commonly being provided?

- ✓ Seed rate per ha
- ✓ Good agronomic practice
- ✓ Type of seed treatment
- ✓ IPM etc

6.1.3 How is such information mainly being communicated (means, tools, channels like verbal communication, village meetings, farm demonstrations, radio broadcasts, leaflets etc.)? How effective is this?

- ✓ Local trainings
- ✓ Supervision and consultation
- ✓ Upon seed distribution etc
- ✓ Farmers field day (experience sharing) etc
- ✓ Informal chat with fellow farmers who get prior information or used the seed

It is the model of Ethiopian government agricultural extension for all commodities and thought to be fairly efficient

6.1.4 How do farmers feel informed?

- ✓ During training sessions and consultations they could come up with feed back
- ✓ They could come to local extension and cooperative offices to buy different inputs and share information
- ✓ There is a likely hood to chat with fellow farmers who are informed a head

6.1.5 Do cotton farmers provide feedback on seed quality, varieties, technical experiences on use of seeds etc.? If yes, to whom and how
If no, why not?

Yes

- ✓ During training sessions and consultations they could come up with feed back
- ✓ They could come to local extension and cooperative offices to share information/feedback

6.1.6 Are there any specific difficulties faced by disadvantaged groups (women and youth) in accessing this information?

No. Any interested group have possibility to get information from local extension and cooperative offices without any discrimination

6.1.7 How are cotton seeds planted: mode of sowing (manual, animal draught, mechanical)

There are different cropping system depending on scale of production, farmer type and watering condition

- ✓ Farmers predominantly use animal drawn and broad casting type of sowing(manual)
- ✓ Rain fed farms use mechanical ploughing and planting but broadcasting by planter/manual
- ✓ Irrigated farms use mechanical ploughing and row planting with row planter

6.2. Farmer Uptake

6.2.1 Which are the main cotton varieties used by smallholder farmers, by intermediate farmers, and by commercial farmers? What are the reasons?

.

- ✓ Smallholder farmers are defined as those farmers owning small plots of land (<2 ha) on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labour.
- ✓ Intermediate farmers are those who cultivate plots of land of several ha (between 2 and 10 ha), and are partly mechanized
- ✓ Commercial farmers are those who predominantly produce market crops for profit on larger plots of land (>10 ha), applying more advanced technological means and external workers

6.2.2 What are typical quality issues related to cottonseed in the formal and informal sector?

- ✓ the most common type variety by small scale, intermediate and commercial farmers all over the country has been Delta pine 90
- ✓ Some commercial farms use Acala SJ2 (Humera area, Tigray)
- ✓ Claudia has been used recently by commercial farmers

6.3. Major Constraints

6.3.1 Related to areas above, identification of key constraints facing the cottonseed system.. Analysis of underlying reasons for constraints, incl. legal framework (be specific), government policies, natural resource endowment, technical know-how etc.

7. Additional information

Additional comments, remarks and proposals about the whole questionnaire